(12) UK Patent Application (19) GB (11) 2 387 930 (13) A

(43) Date of A Publication 29.10.2003

(21) Application No 0209124.7

(22) Date of Filing 22.04.2002

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(51) INT CL[7]
G06F 17/60 15/02

(52) UK CL (Edition V)
G4A AUXB

(56) Documents Cited
WO 1999/023618 A1
WO1995/023377 A1
US 4737911 A
US 4724527 A
US 4222109 A

(58) Field of Search
INT CL[7] G06F 15/02 17/60
Other: Online databases: EPODOC, JAPIO, WPI

(54) Abstract Title
Electronic organiser for financial planning

(57) A fully portable self-contained electronic recording, planning and calculating device incorporated with electronic clock and calendar that is configured to assist personal financial planning and organisation. The device provides a convenient, instantaneous, accurate, up-to-date means of recording and tracking the amounts and timings of the user's expenditure and receipts and the resultant balances on his bank accounts and credit cards. The device also computes what the user has left to spend on each bank and credit card account, taking into account fixture commitments including standing orders and direct debits between now and his next income receipt as well as overdraft and credit card limits. In addition, the device provides an automatic reminder facility for the user to action regular manual payments. Preferably the device is constructed in size and shape such that it can be co-located in a wallet with the user's cash and payment cards.

GB 2 387 930 A

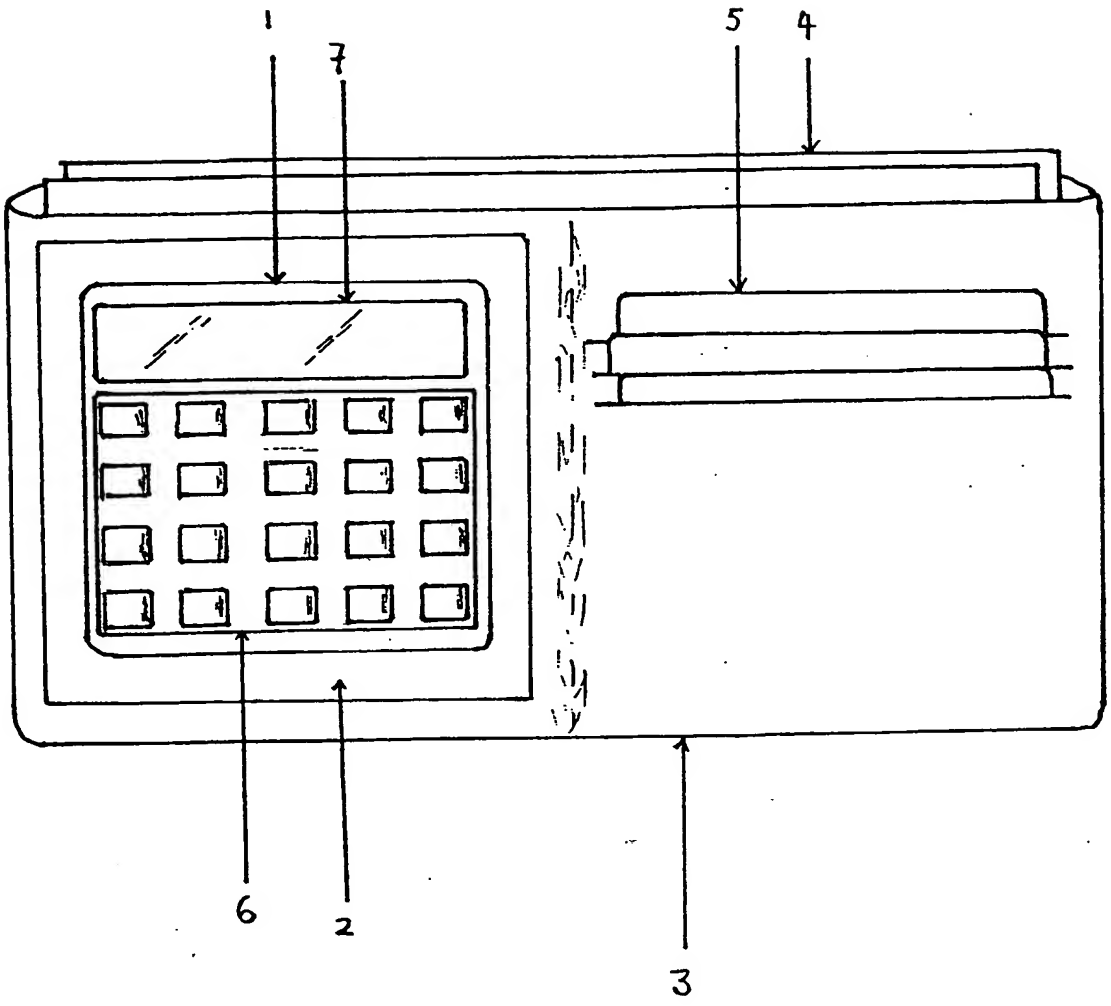

FIG. 1

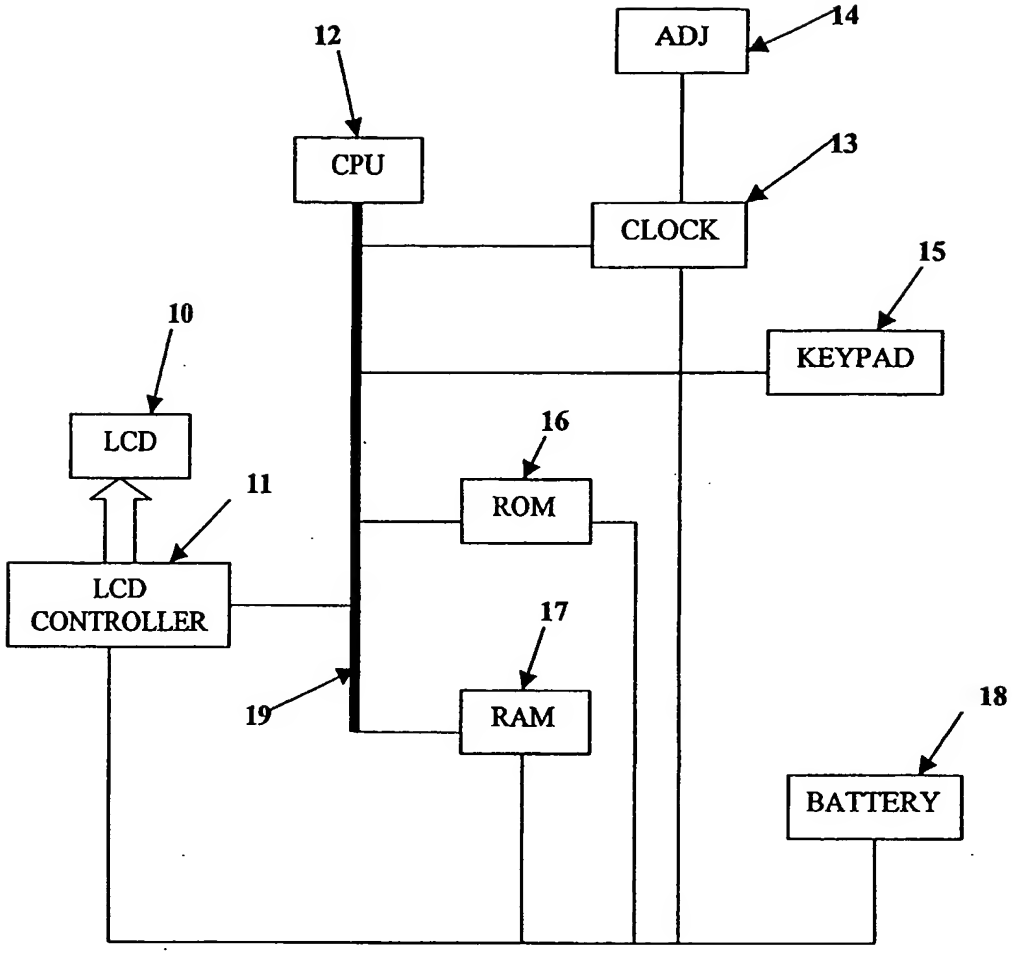
12
ADJ
14
CPU
13
CLOCK
15
10
KEYPAD
LCD
16
11
ROM
LCD
CONTROLLER
17
19
RAM
18
BATTERY

FIG. 2

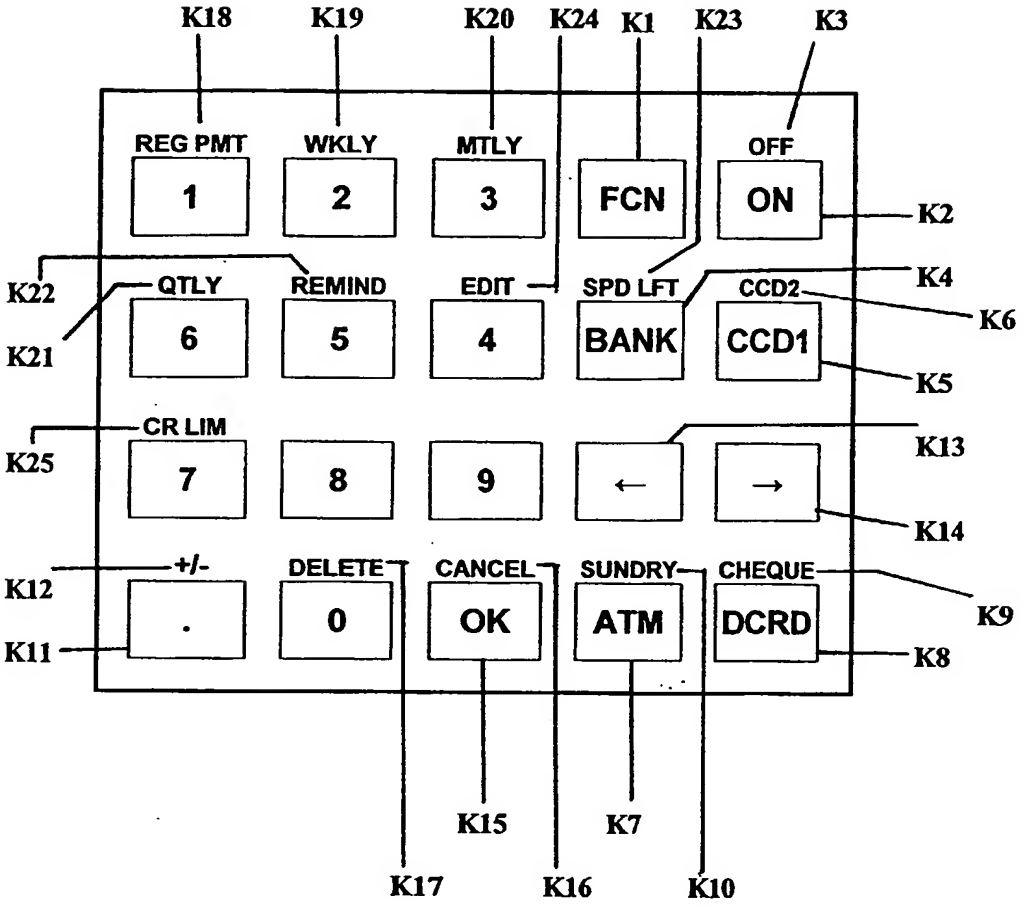
K18
K19
K20
K24
K1
K23
K3
REG PMT
WKLY
MTLY
OFF
1
2
3
FCN
ON
K2
K22
QTLY
REMIND
EDIT
SPD LFT
CCD2
K4
K6
K21
6
5
4
BANK
CCD1
K5
CR LIM
K25
K13
7
8
9
←
→
K14
+/-
DELETE
CANCEL
SUNDRY
CHEQUE
K12
K9
.
0
OK
ATM
DCRD
K11
K8
K15
K7
K17
K16
K10

FIG. 3

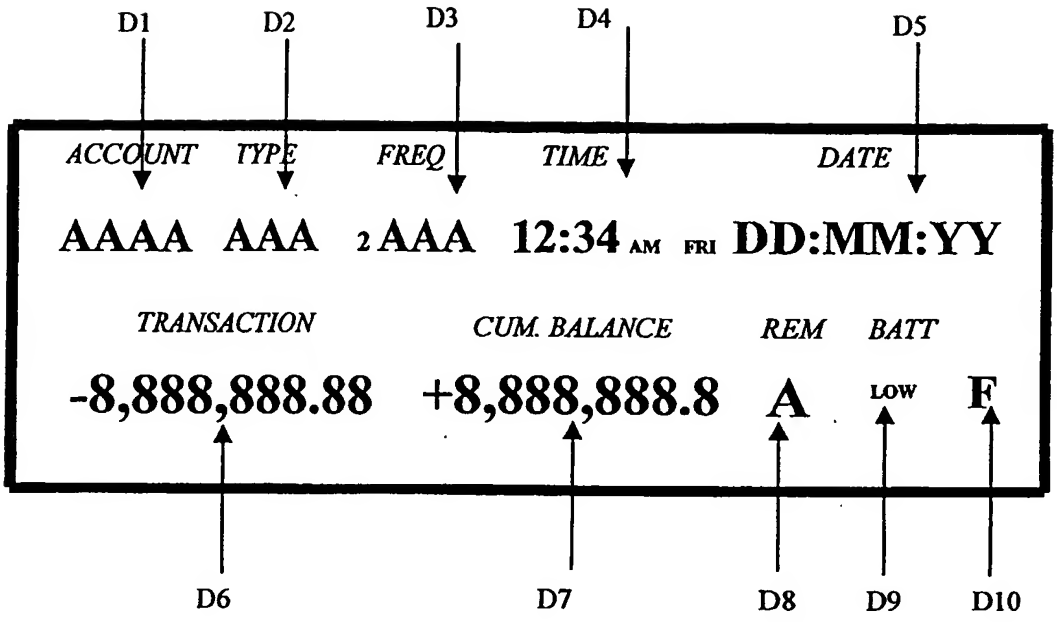
D1
D2
D3
D4
D5
ACCOUNT
TYPE
FREQ
TIME
DATE
AAAA AAA 2AAA 12:34 AM FRI DD:MM:YY
TRANSACTION
CUM. BALANCE
REM
BATT
-8,888,888.88 +8,888,888.8 A LOW F
D6
D7
D8
D9
D10

FIG. 4

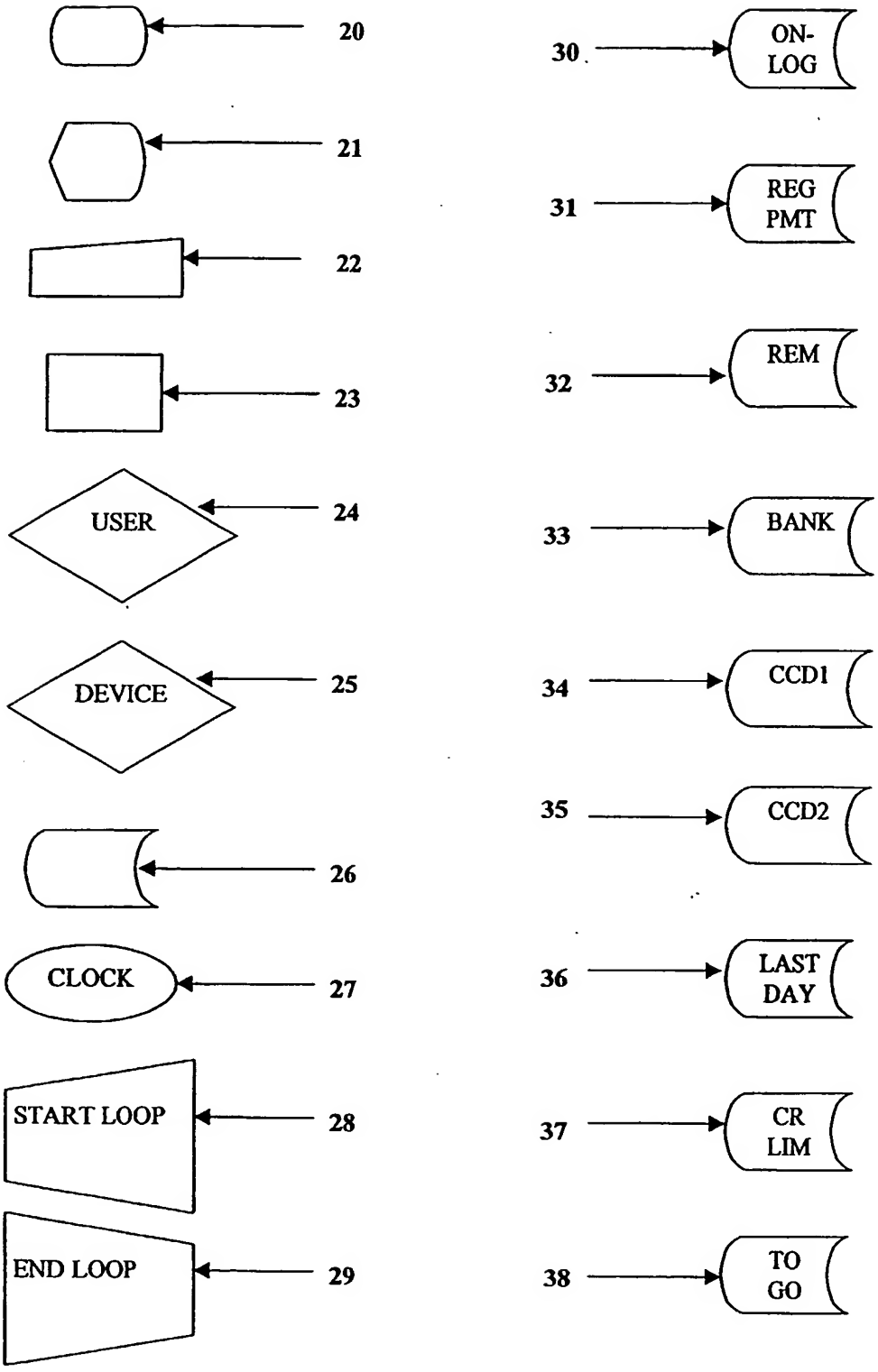
20
21
22
23
USER
24
DEVICE
25
26
CLOCK
27
START LOOP
28
END LOOP
29
30
ON-
LOG
31
REG
PMT
32
REM
33
BANK
34
CCD1
35
CCD2
36
LAST
DAY
37
CR
LIM
38
TO
GO

FIG. 5(a)

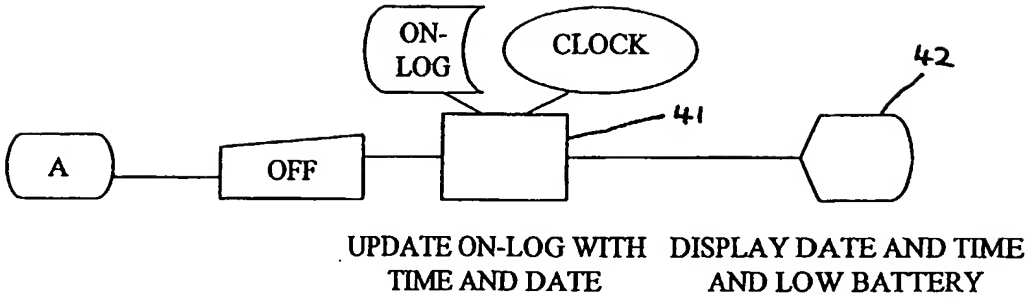
ON-
LOG
CLOCK
42
41
A
OFF
UPDATE ON-LOG WITH
TIME AND DATE
DISPLAY DATE AND TIME
AND LOW BATTERY

FIG. 5(b)

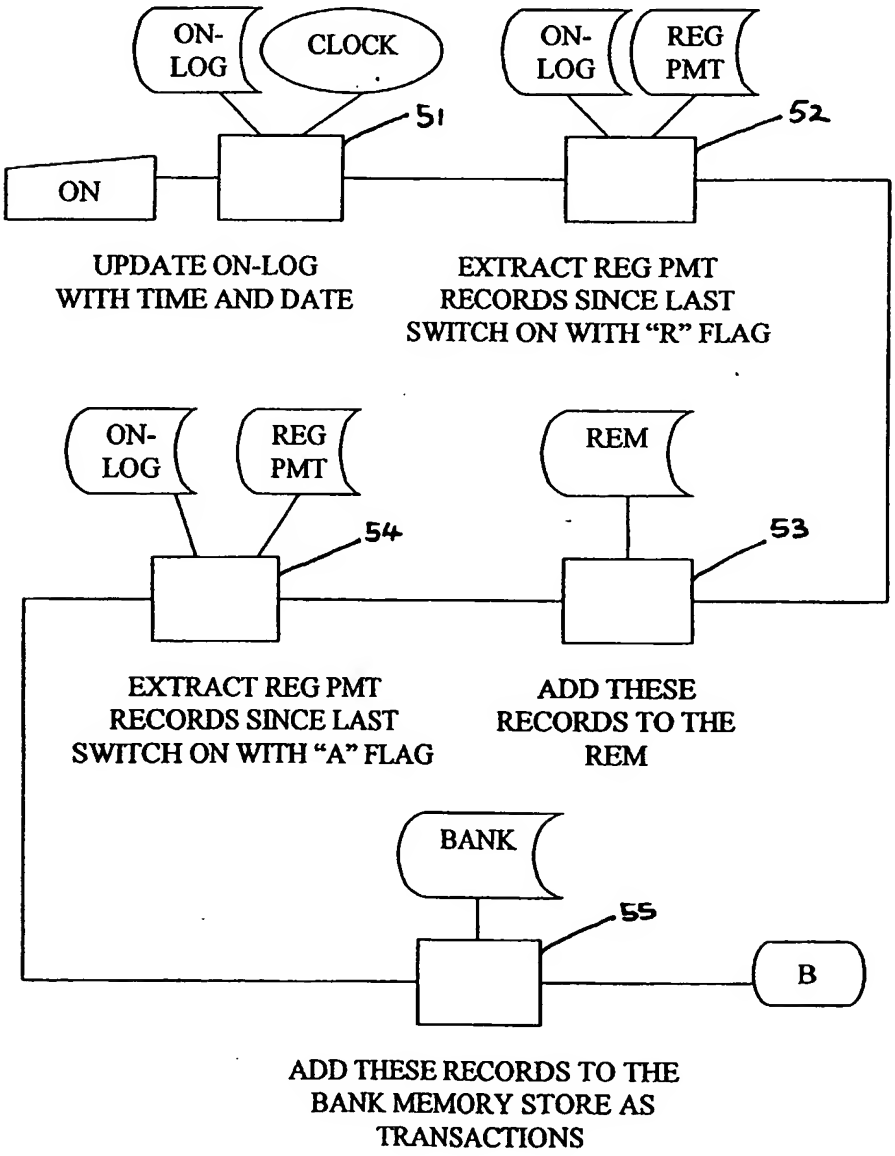
ON-
LOG
CLOCK
51
ON-
LOG
REG
PMT
52
ON
UPDATE ON-LOG
WITH TIME AND DATE
EXTRACT REG PMT
RECORDS SINCE LAST
SWITCH ON WITH "R" FLAG
ON-
LOG
REG
PMT
54
REM
53
EXTRACT REG PMT
RECORDS SINCE LAST
SWITCH ON WITH "A" FLAG
ADD THESE
RECORDS TO THE
REM
BANK
55
B
ADD THESE RECORDS TO THE
BANK MEMORY STORE AS
TRANSACTIONS

FIG. 5(c)

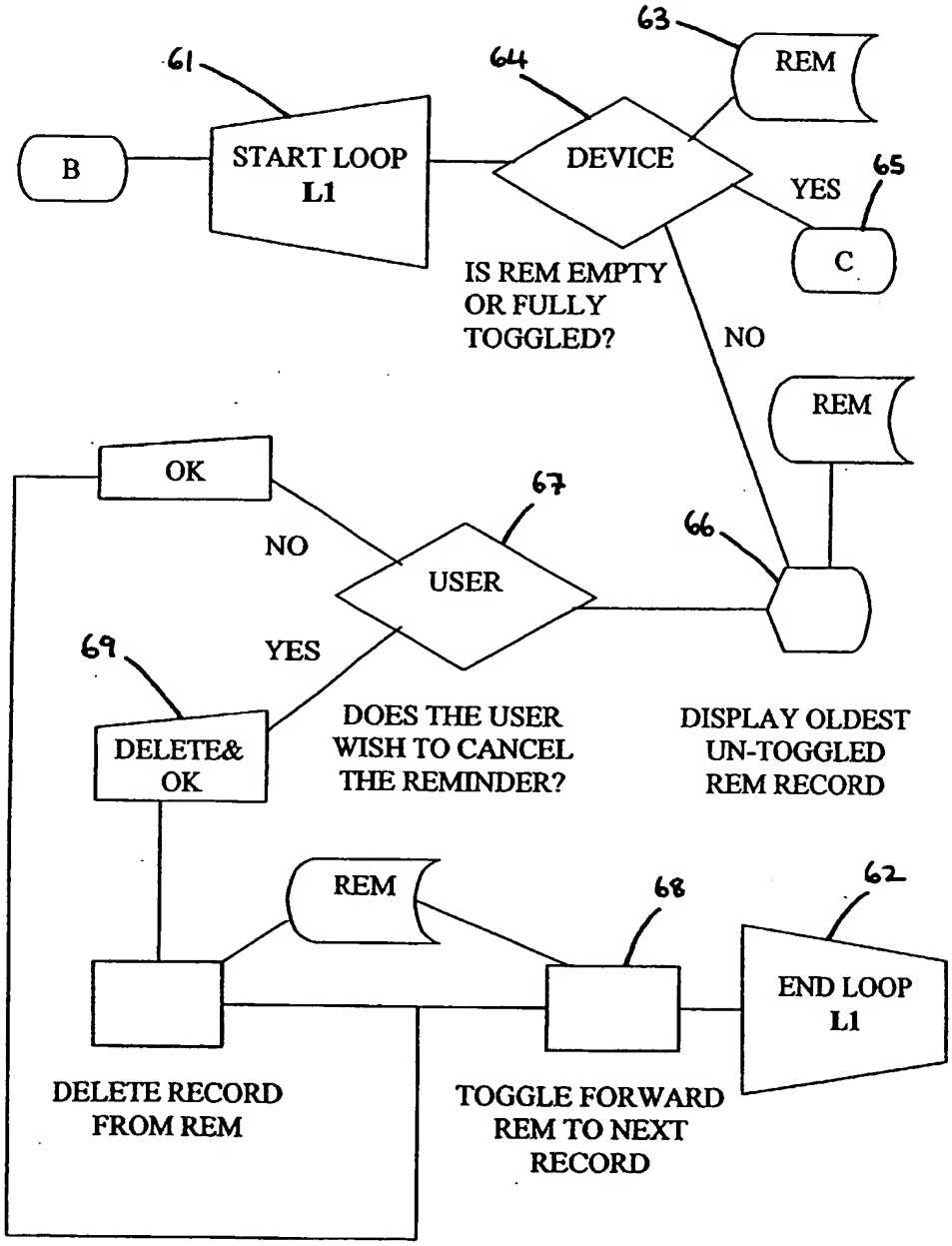
63
REM
61
64
B
START LOOP
L1
DEVICE
YES
65
C
IS REM EMPTY
OR FULLY
TOGGLED?
NO
REM
OK
67
66
NO
USER
69
YES
DELETE&
OK
DOES THE USER
WISH TO CANCEL
THE REMINDER?
DISPLAY OLDEST
UN-TOGGLED
REM RECORD
REM
68
62
END LOOP
L1
DELETE RECORD
FROM REM
TOGGLE FORWARD
REM TO NEXT
RECORD

FIG. 5(d)

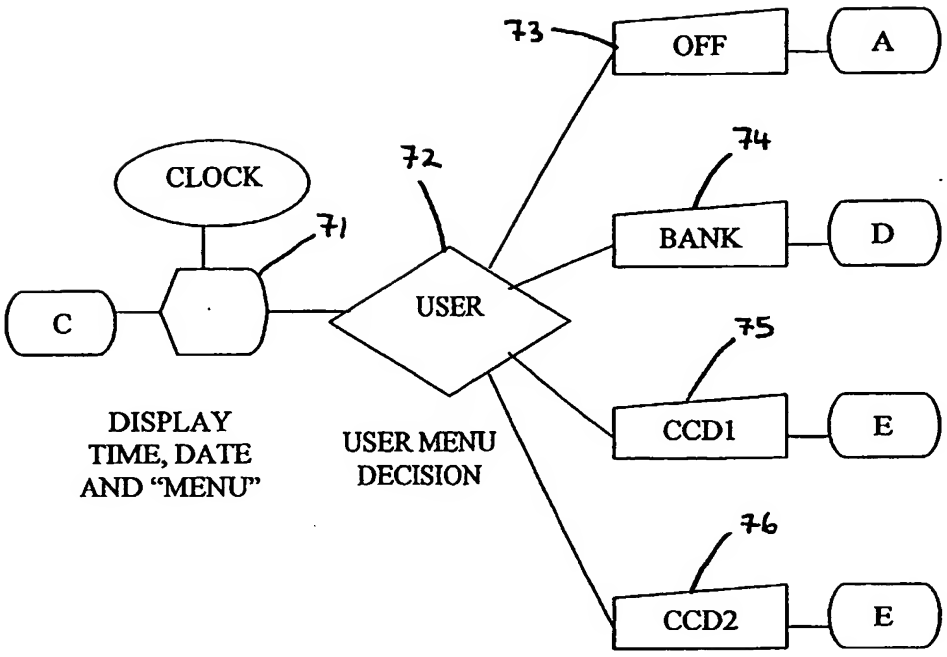
73
OFF
A
74
BANK
D
72
CLOCK
71
C
USER
75
CCD1
E
DISPLAY
TIME, DATE
AND "MENU"
USER MENU
DECISION
76
CCD2
E

FIG. 5(e)

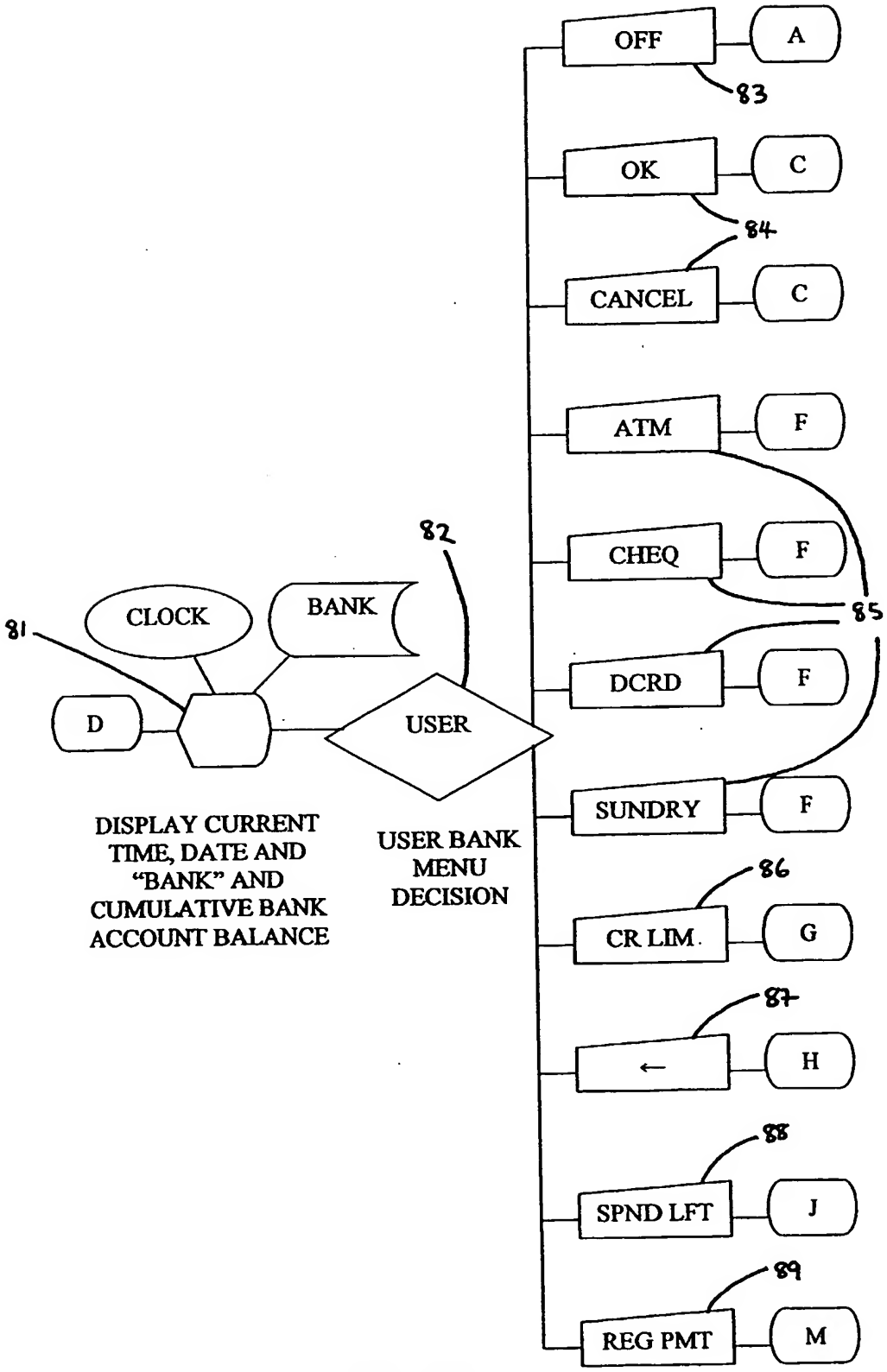
OFF
A
83
OK
C
84
CANCEL
C
ATM
F
82
CHEQ
F
85
CLOCK
BANK
81
DCRD
F
D
USER
SUNDRY
F
DISPLAY CURRENT TIME, DATE AND "BANK" AND CUMULATIVE BANK ACCOUNT BALANCE
USER BANK MENU DECISION
86
CR LIM.
G
87
←
H
88
SPND LFT
J
89
REG PMT
M

FIG. 5(f)

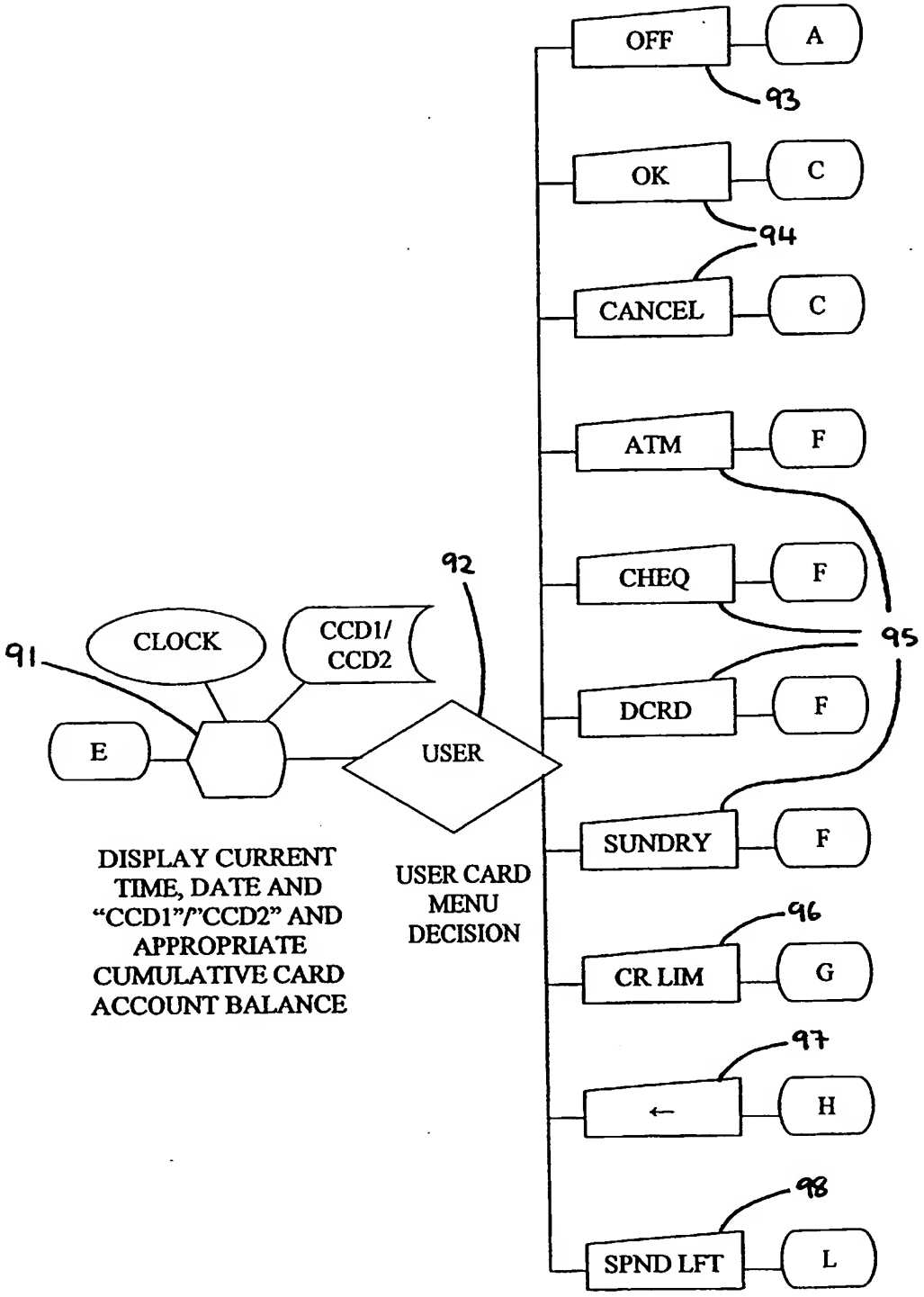
OFF
A
93
OK
C
94
CANCEL
C
ATM
F
CHEQ
F
95
DCRD
F
SUNDRY
F
96
CR LIM
G
97
←
H
98
SPND LFT
L
92
CLOCK
CCD1/
CCD2
91
E
USER
DISPLAY CURRENT TIME, DATE AND "CCD1"/"CCD2" AND APPROPRIATE CUMULATIVE CARD ACCOUNT BALANCE
USER CARD MENU DECISION

FIG. 5(g)

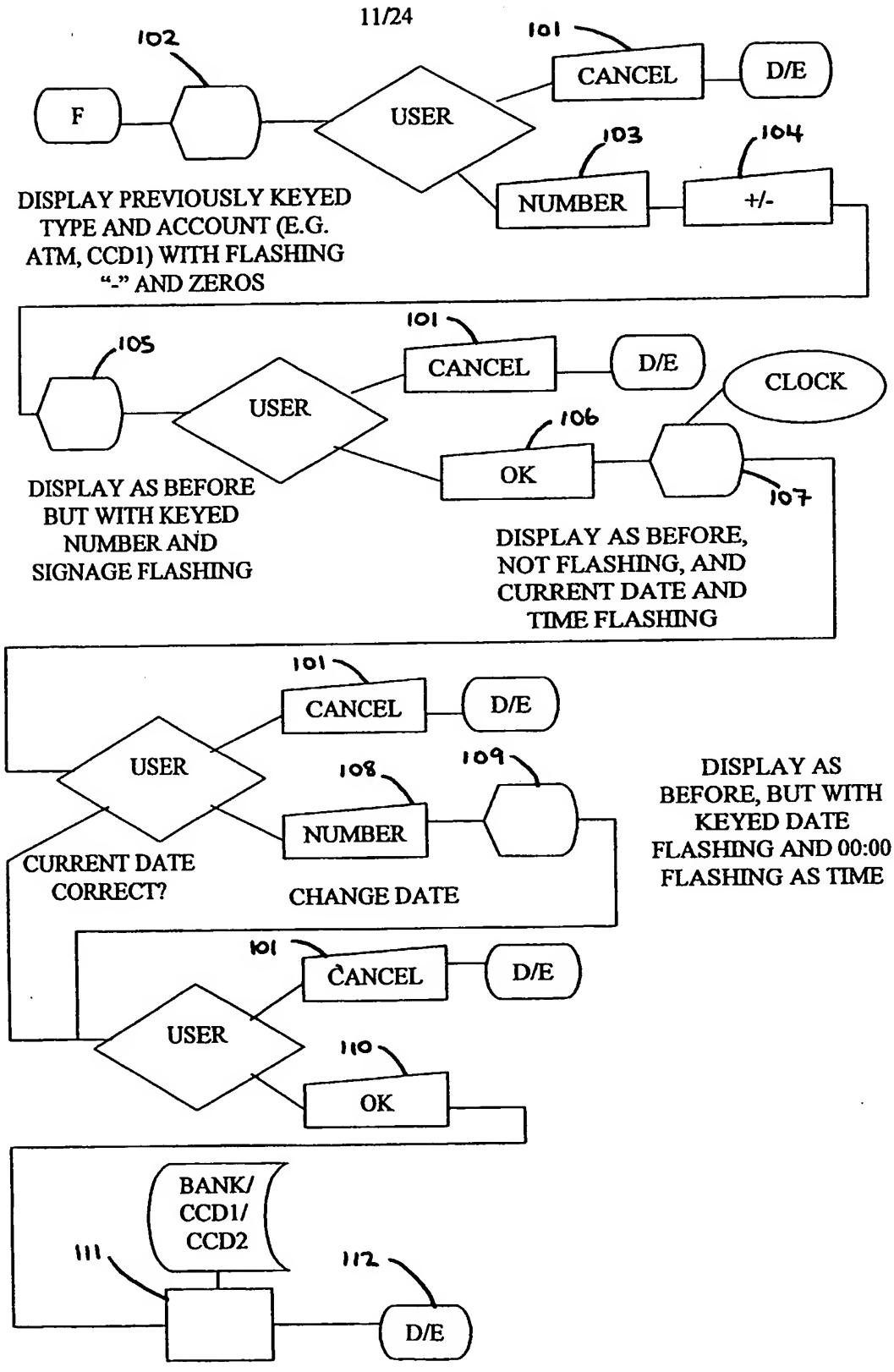
102
F
USER
101
CANCEL
D/E
103
NUMBER
104
+/-
DISPLAY PREVIOUSLY KEYED TYPE AND ACCOUNT (E.G. ATM, CCD1) WITH FLASHING "-" AND ZEROS
105
USER
101
CANCEL
D/E
CLOCK
106
OK
107
DISPLAY AS BEFORE BUT WITH KEYED NUMBER AND SIGNAGE FLASHING
DISPLAY AS BEFORE, NOT FLASHING, AND CURRENT DATE AND TIME FLASHING
101
CANCEL
D/E
USER
108
NUMBER
109
CURRENT DATE CORRECT?
CHANGE DATE
DISPLAY AS BEFORE, BUT WITH KEYED DATE FLASHING AND 00:00 FLASHING AS TIME
101
CANCEL
D/E
USER
110
OK
BANK/ CCD1/ CCD2
111
112
D/E
INPUT RECORD TO RELEVANT MEMORY STORE

FIG. 5(h)

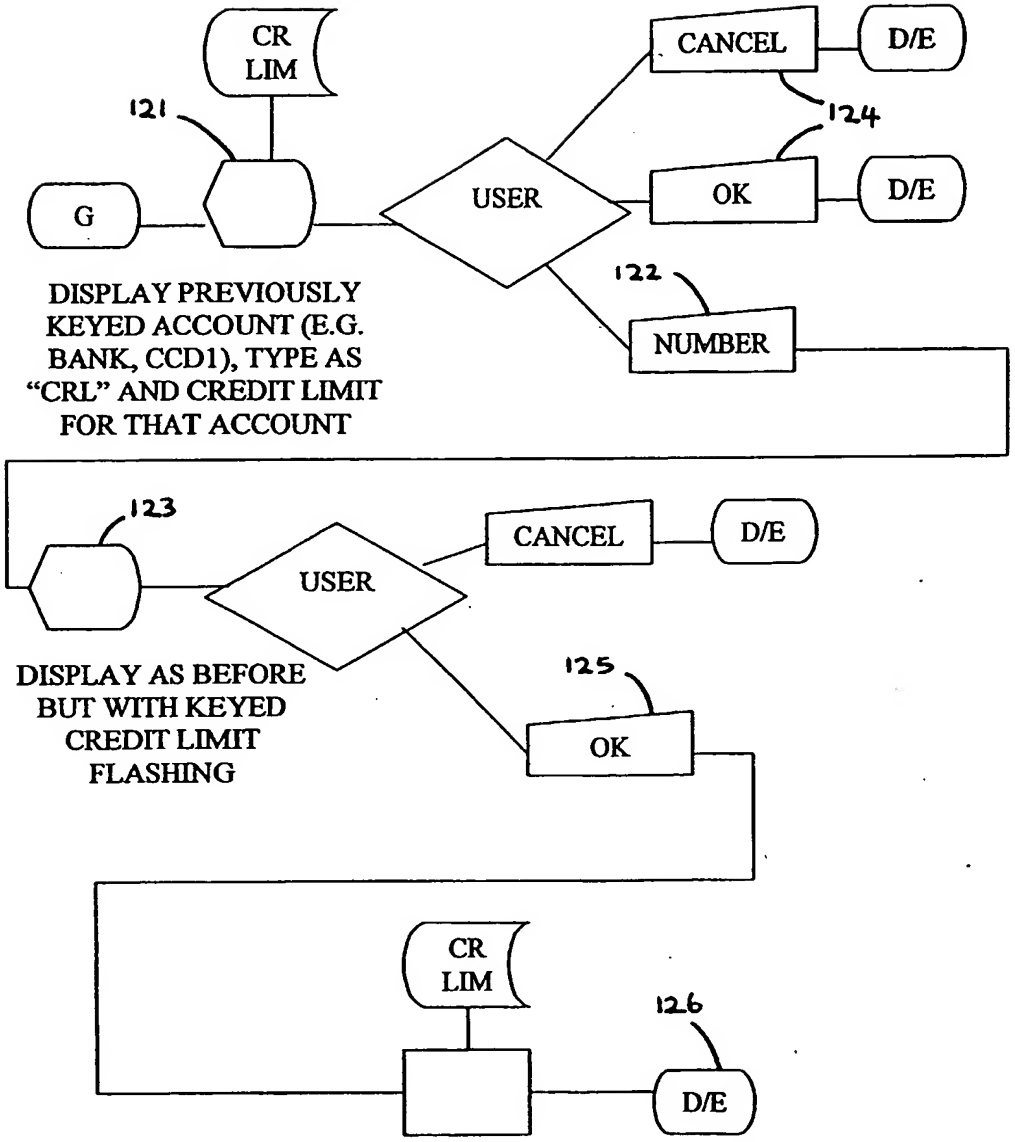
CR LIM
121
G
USER
CANCEL
D/E
124
OK
D/E
122
NUMBER
DISPLAY PREVIOUSLY KEYED ACCOUNT (E.G. BANK, CCD1), TYPE AS "CRL" AND CREDIT LIMIT FOR THAT ACCOUNT
123
USER
CANCEL
D/E
DISPLAY AS BEFORE BUT WITH KEYED CREDIT LIMIT FLASHING
125
OK
CR LIM
126
D/E
UPDATE CREDIT LIMIT MEMORY STORE FOR APPROPRIATE ACCOUNT

FIG. 5(i)

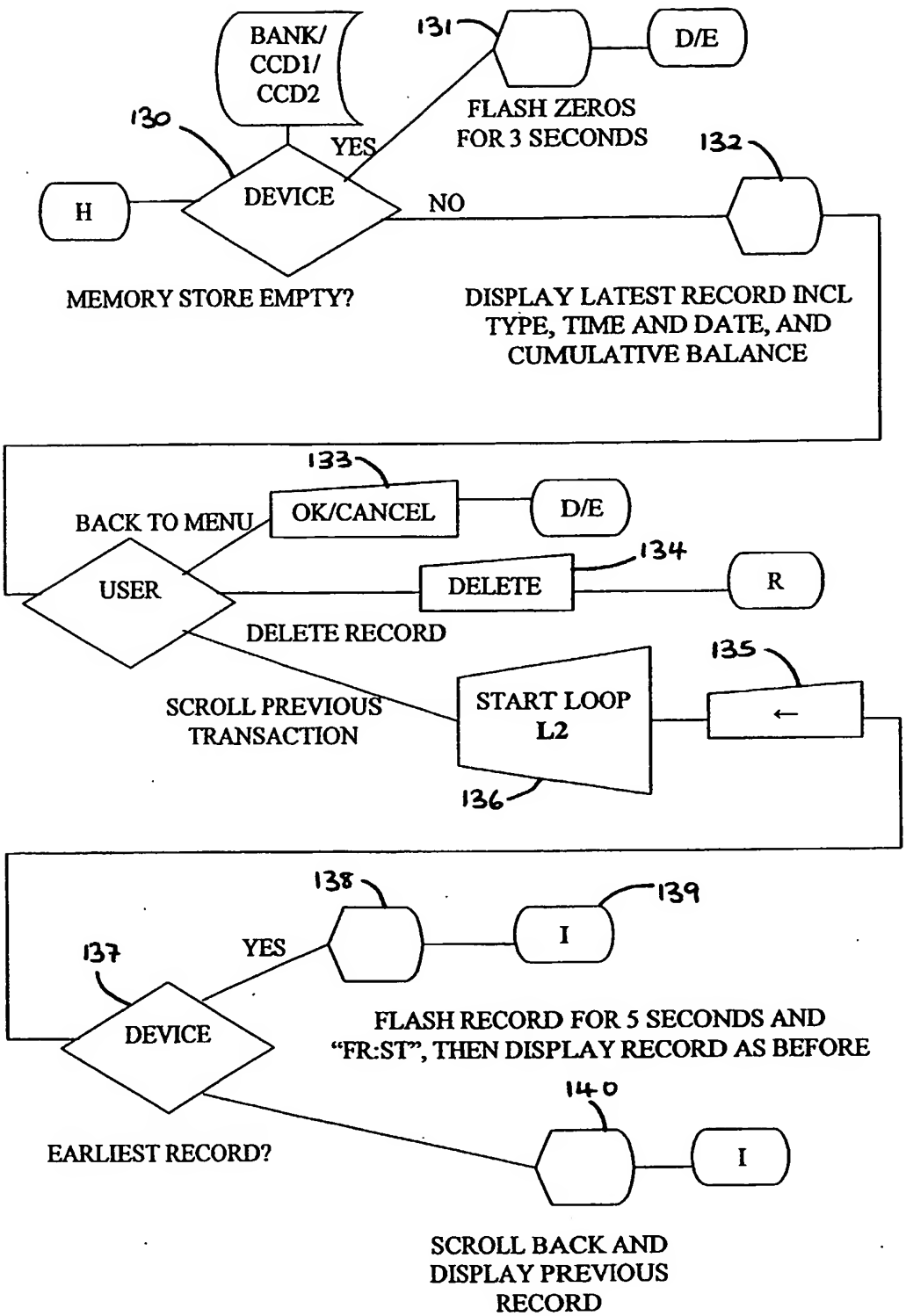
BANK/
CCD1/
CCD2
131
D/E
FLASH ZEROS
FOR 3 SECONDS
130
YES
132
H
DEVICE
NO
MEMORY STORE EMPTY?
DISPLAY LATEST RECORD INCL
TYPE, TIME AND DATE, AND
CUMULATIVE BALANCE
133
BACK TO MENU
OK/CANCEL
D/E
134
USER
DELETE
R
DELETE RECORD
135
SCROLL PREVIOUS
TRANSACTION
START LOOP
L2
←
136
138
139
I
YES
137
DEVICE
FLASH RECORD FOR 5 SECONDS AND
"FR:ST", THEN DISPLAY RECORD AS BEFORE
140
EARLIEST RECORD?
I
SCROLL BACK AND
DISPLAY PREVIOUS
RECORD

FIG. 5(j)

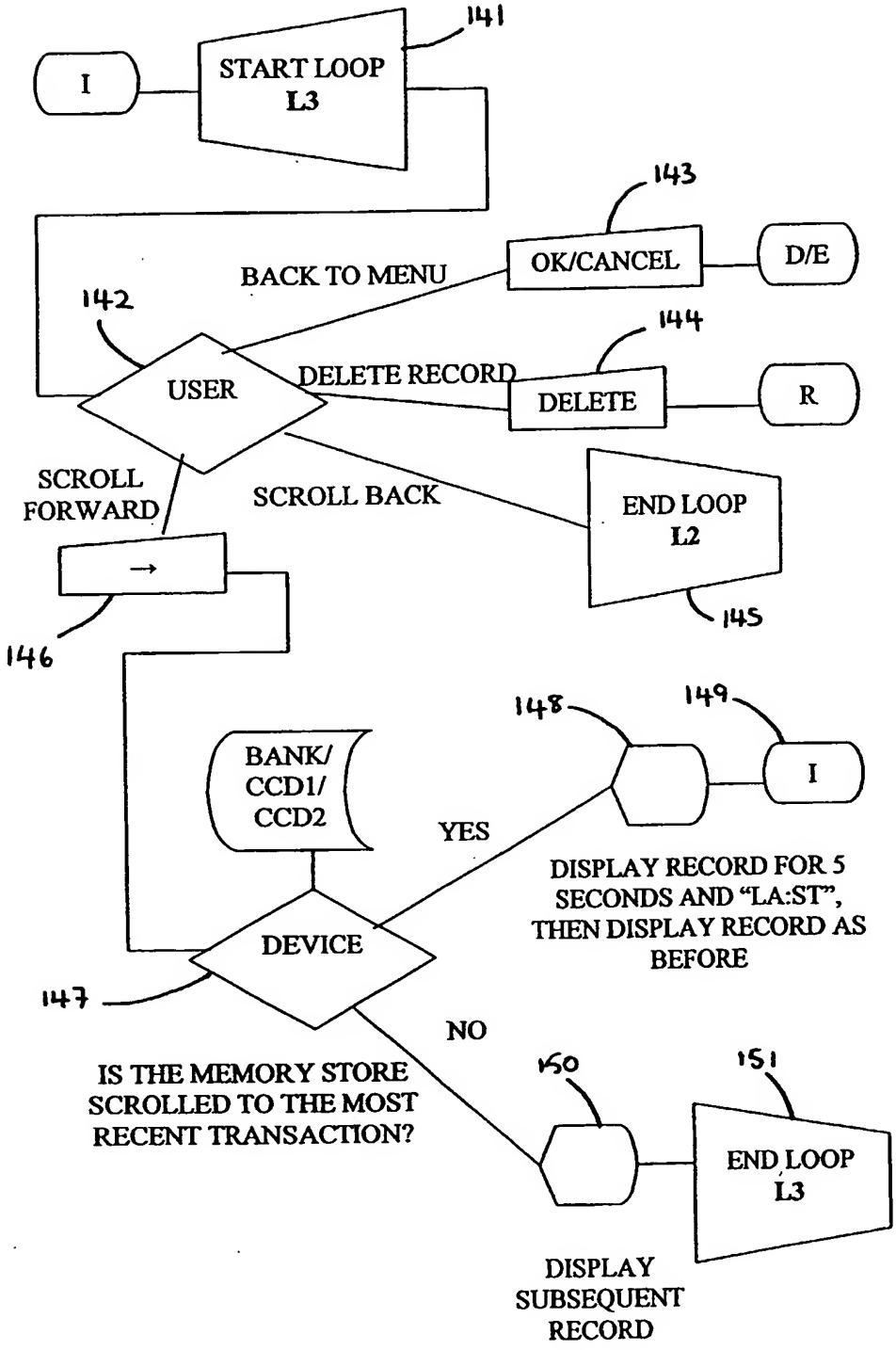
141
I
START LOOP
L3
143
OK/CANCEL
D/E
BACK TO MENU
142
USER
DELETE RECORD
144
DELETE
R
SCROLL
FORWARD
SCROLL BACK
END LOOP
L2
145
146
→
148
149
BANK/
CCD1/
CCD2
I
YES
DISPLAY RECORD FOR 5
SECONDS AND "LA:ST",
THEN DISPLAY RECORD AS
BEFORE
DEVICE
147
NO
IS THE MEMORY STORE
SCROLLED TO THE MOST
RECENT TRANSACTION?
150
151
END LOOP
L3
DISPLAY
SUBSEQUENT
RECORD

FIG. 5(k)

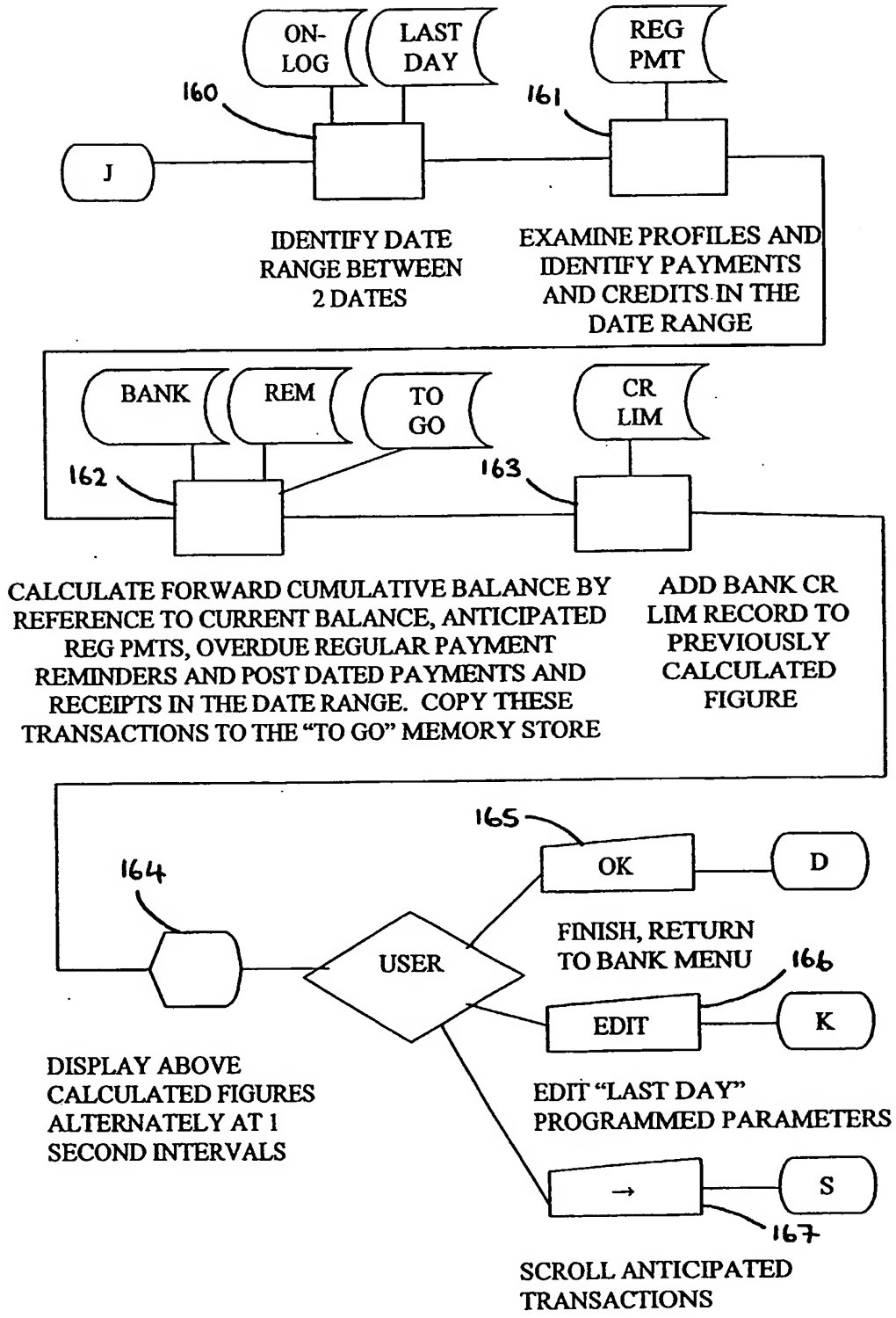
ON-LOG
LAST DAY
REG PMT
160
161
J
IDENTIFY DATE RANGE BETWEEN 2 DATES
EXAMINE PROFILES AND IDENTIFY PAYMENTS AND CREDITS IN THE DATE RANGE
BANK
REM
TO GO
CR LIM
162
163
CALCULATE FORWARD CUMULATIVE BALANCE BY REFERENCE TO CURRENT BALANCE, ANTICIPATED REG PMTS, OVERDUE REGULAR PAYMENT REMINDERS AND POST DATED PAYMENTS AND RECEIPTS IN THE DATE RANGE. COPY THESE TRANSACTIONS TO THE "TO GO" MEMORY STORE
ADD BANK CR LIM RECORD TO PREVIOUSLY CALCULATED FIGURE
165
OK
D
164
USER
FINISH, RETURN TO BANK MENU
166
EDIT
K
DISPLAY ABOVE CALCULATED FIGURES ALTERNATELY AT 1 SECOND INTERVALS
EDIT "LAST DAY" PROGRAMMED PARAMETERS
→
S
167
SCROLL ANTICIPATED TRANSACTIONS

FIG. 5(I)

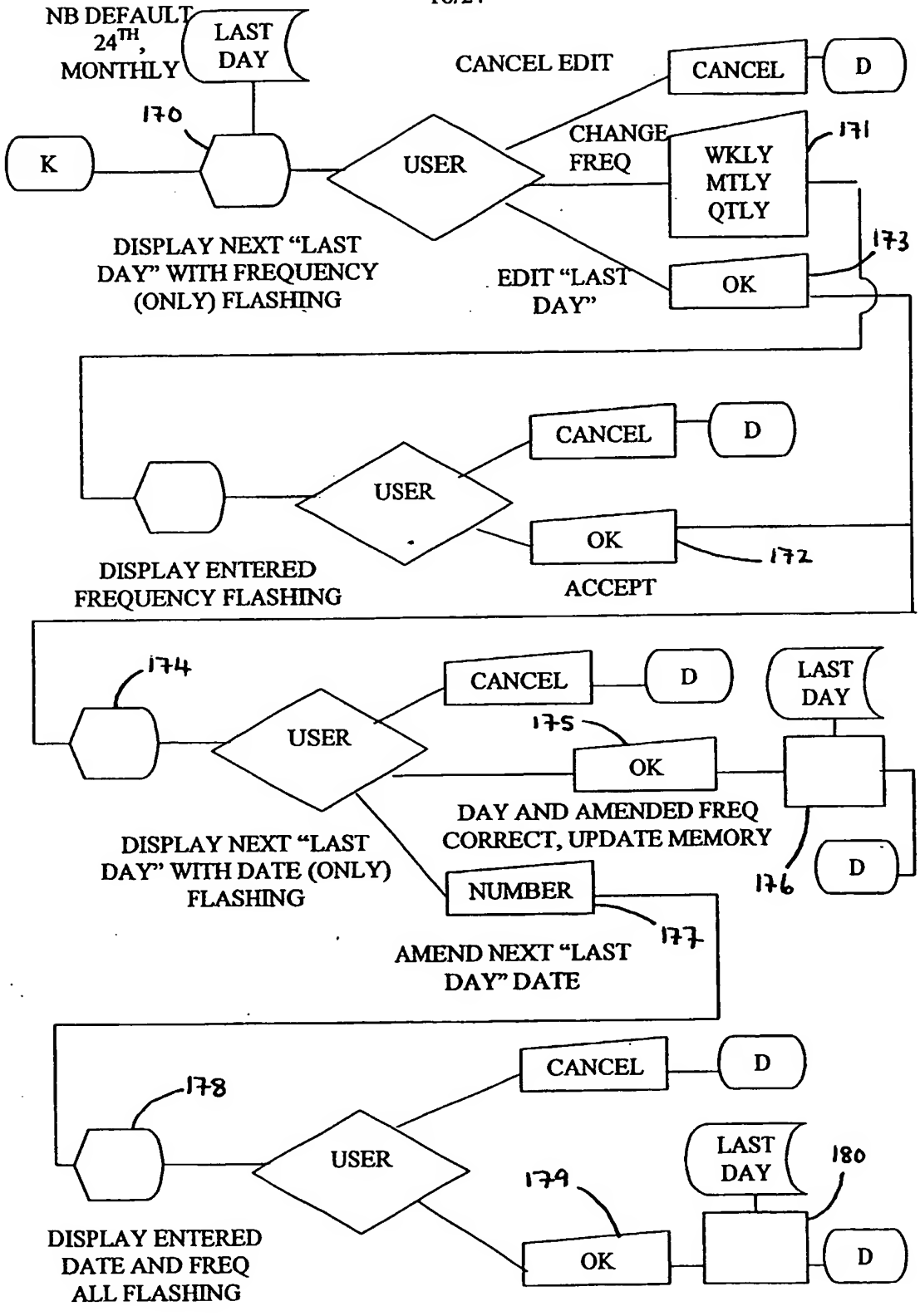
NB DEFAULT 24TH, MONTHLY
LAST DAY
170
K
USER
CANCEL EDIT
CANCEL
D
CHANGE FREQ
WKLY MTLY QTLY
171
DISPLAY NEXT "LAST DAY" WITH FREQUENCY (ONLY) FLASHING
EDIT "LAST DAY"
OK
173
CANCEL
D
USER
OK
172
DISPLAY ENTERED FREQUENCY FLASHING
ACCEPT
174
CANCEL
D
LAST DAY
USER
175
OK
DAY AND AMENDED FREQ CORRECT, UPDATE MEMORY
176
D
DISPLAY NEXT "LAST DAY" WITH DATE (ONLY) FLASHING
NUMBER
177
AMEND NEXT "LAST DAY" DATE
CANCEL
D
178
USER
LAST DAY
180
179
OK
D
DISPLAY ENTERED DATE AND FREQ ALL FLASHING
UPDATE LAST DAY MEMORY STORE

FIG. 5(m)

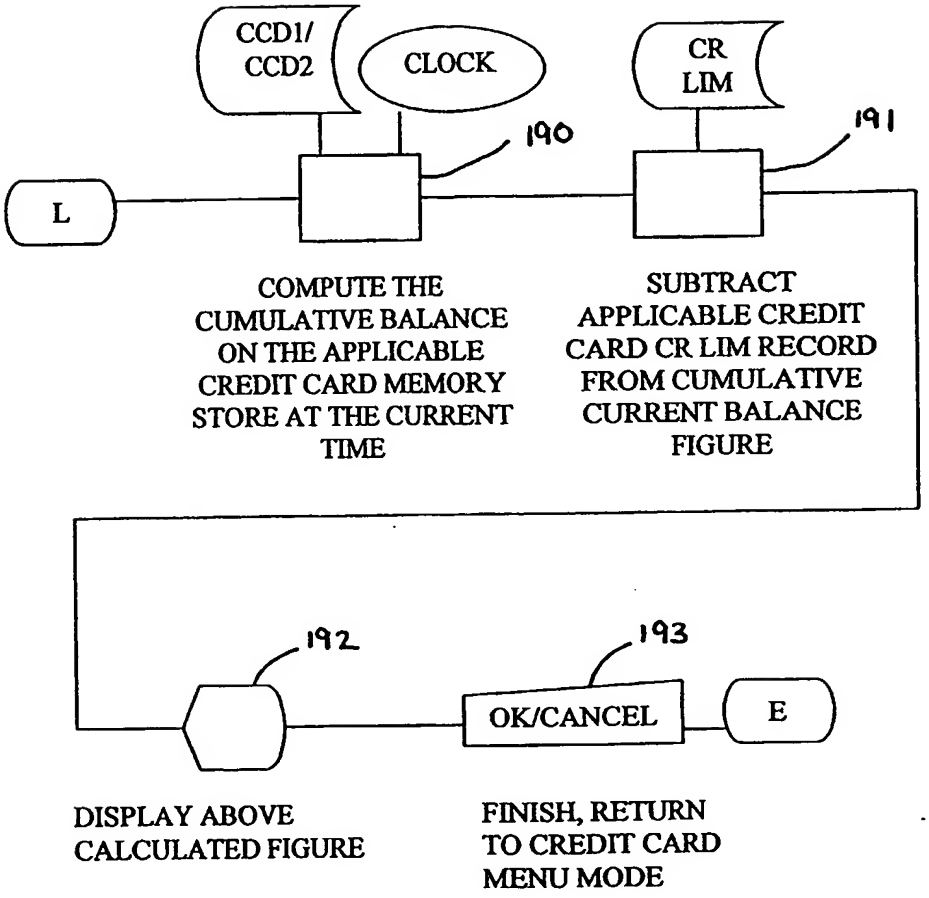
CCD1/
CCD2
CLOCK
CR
LIM
190
191
L
COMPUTE THE CUMULATIVE BALANCE ON THE APPLICABLE CREDIT CARD MEMORY STORE AT THE CURRENT TIME
SUBTRACT APPLICABLE CREDIT CARD CR LIM RECORD FROM CUMULATIVE CURRENT BALANCE FIGURE
192
193
OK/CANCEL
E
DISPLAY ABOVE CALCULATED FIGURE
FINISH, RETURN TO CREDIT CARD MENU MODE

FIG. 5(n)

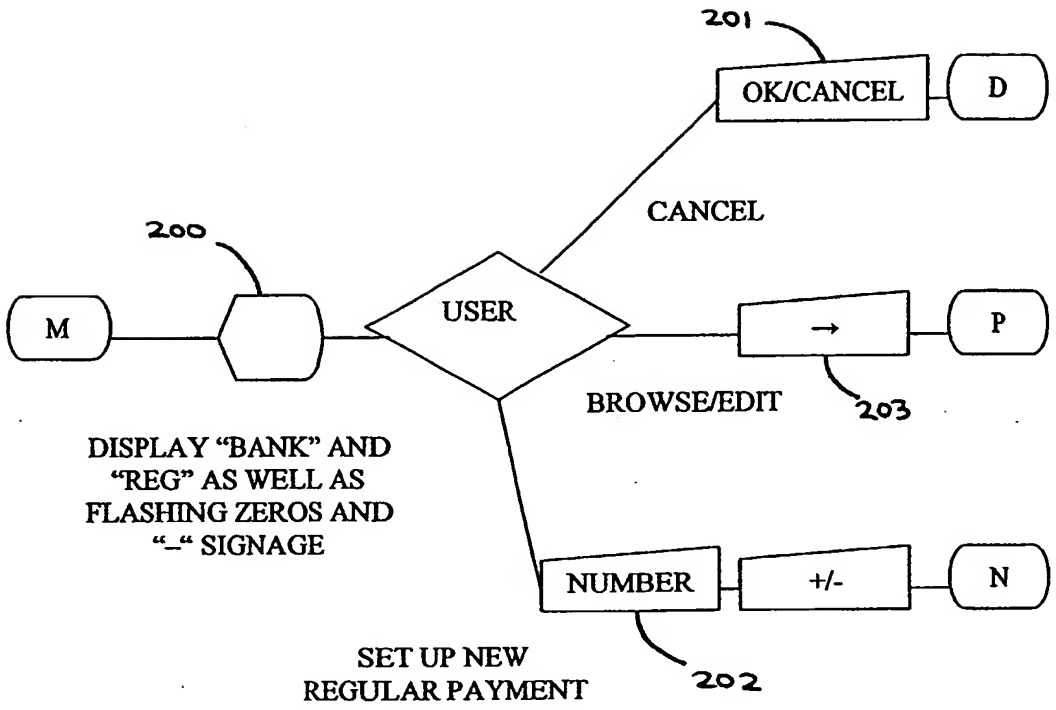
201
OK/CANCEL
D
CANCEL
200
M
USER
→
P
BROWSE/EDIT
203
DISPLAY "BANK" AND
"REG" AS WELL AS
FLASHING ZEROS AND
"-" SIGNAGE
NUMBER
+/-
N
SET UP NEW
REGULAR PAYMENT
202

FIG. 5(o)

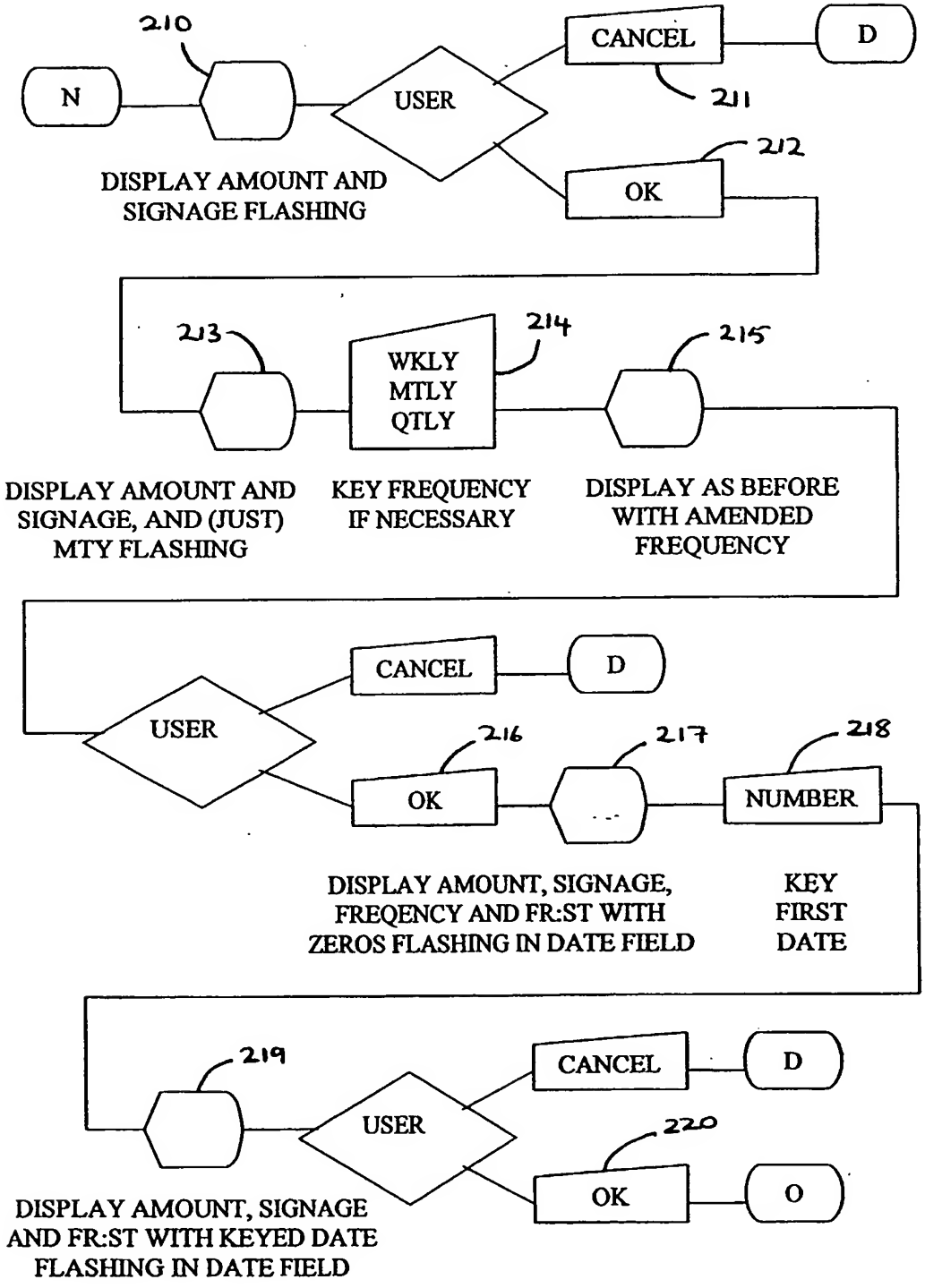
210
N
USER
CANCEL
D
211
212
OK
DISPLAY AMOUNT AND SIGNAGE FLASHING
213
214
215
WKLY
MTLY
QTLY
DISPLAY AMOUNT AND SIGNAGE, AND (JUST) MTY FLASHING
KEY FREQUENCY IF NECESSARY
DISPLAY AS BEFORE WITH AMENDED FREQUENCY
CANCEL
D
USER
216
217
218
OK
NUMBER
DISPLAY AMOUNT, SIGNAGE, FREQENCY AND FR:ST WITH ZEROS FLASHING IN DATE FIELD
KEY FIRST DATE
219
CANCEL
D
USER
220
OK
O
DISPLAY AMOUNT, SIGNAGE AND FR:ST WITH KEYED DATE FLASHING IN DATE FIELD

FIG. 5(p)

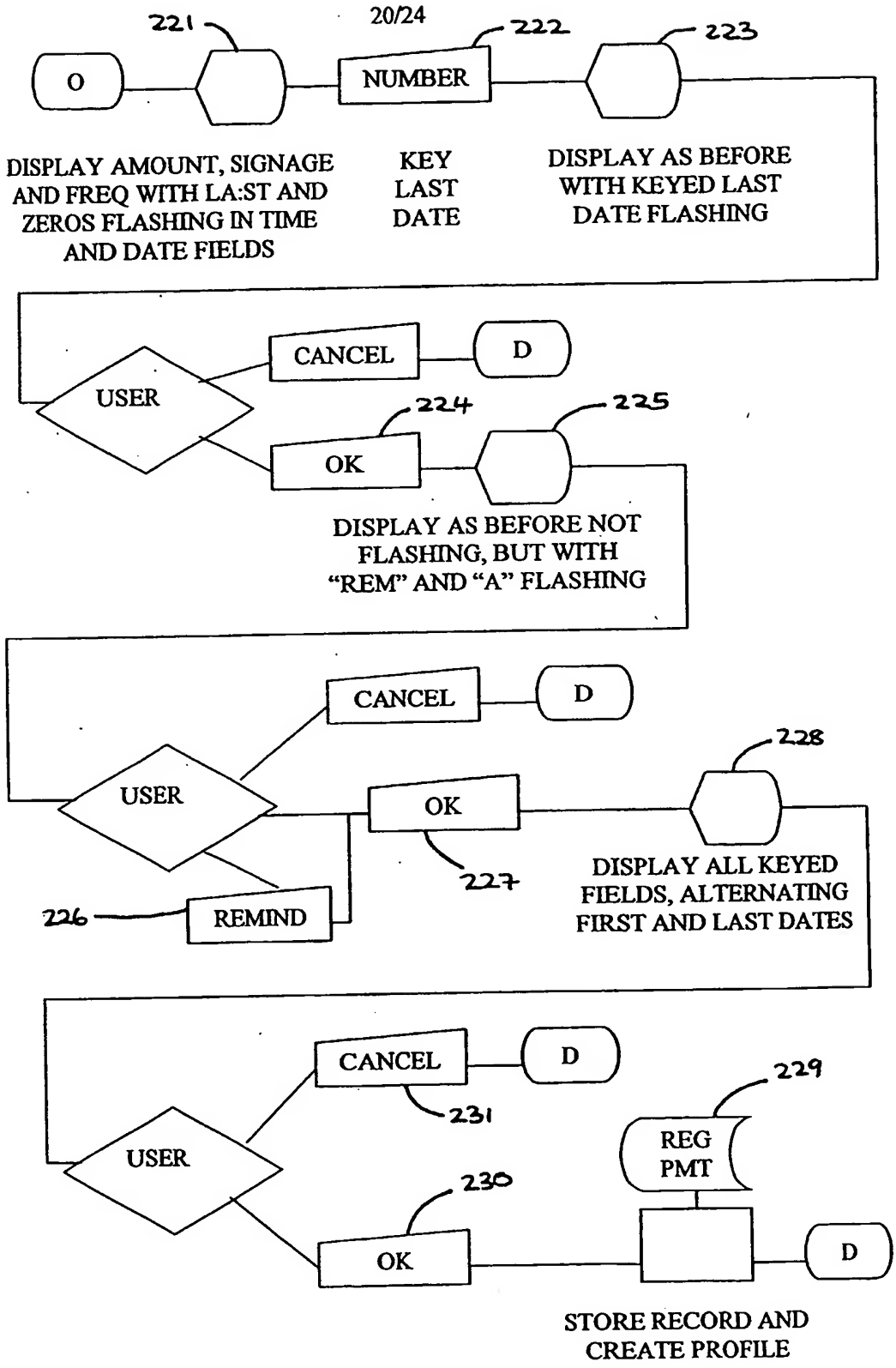
221
222
223
0
NUMBER
DISPLAY AMOUNT, SIGNAGE AND FREQ WITH LA:ST AND ZEROS FLASHING IN TIME AND DATE FIELDS
KEY LAST DATE
DISPLAY AS BEFORE WITH KEYED LAST DATE FLASHING
USER
CANCEL
D
224
225
OK
DISPLAY AS BEFORE NOT FLASHING, BUT WITH "REM" AND "A" FLASHING
CANCEL
D
228
USER
OK
227
DISPLAY ALL KEYED FIELDS, ALTERNATING FIRST AND LAST DATES
226
REMIND
CANCEL
D
229
231
USER
REG PMT
230
OK
D
STORE RECORD AND CREATE PROFILE

FIG. 5(q)

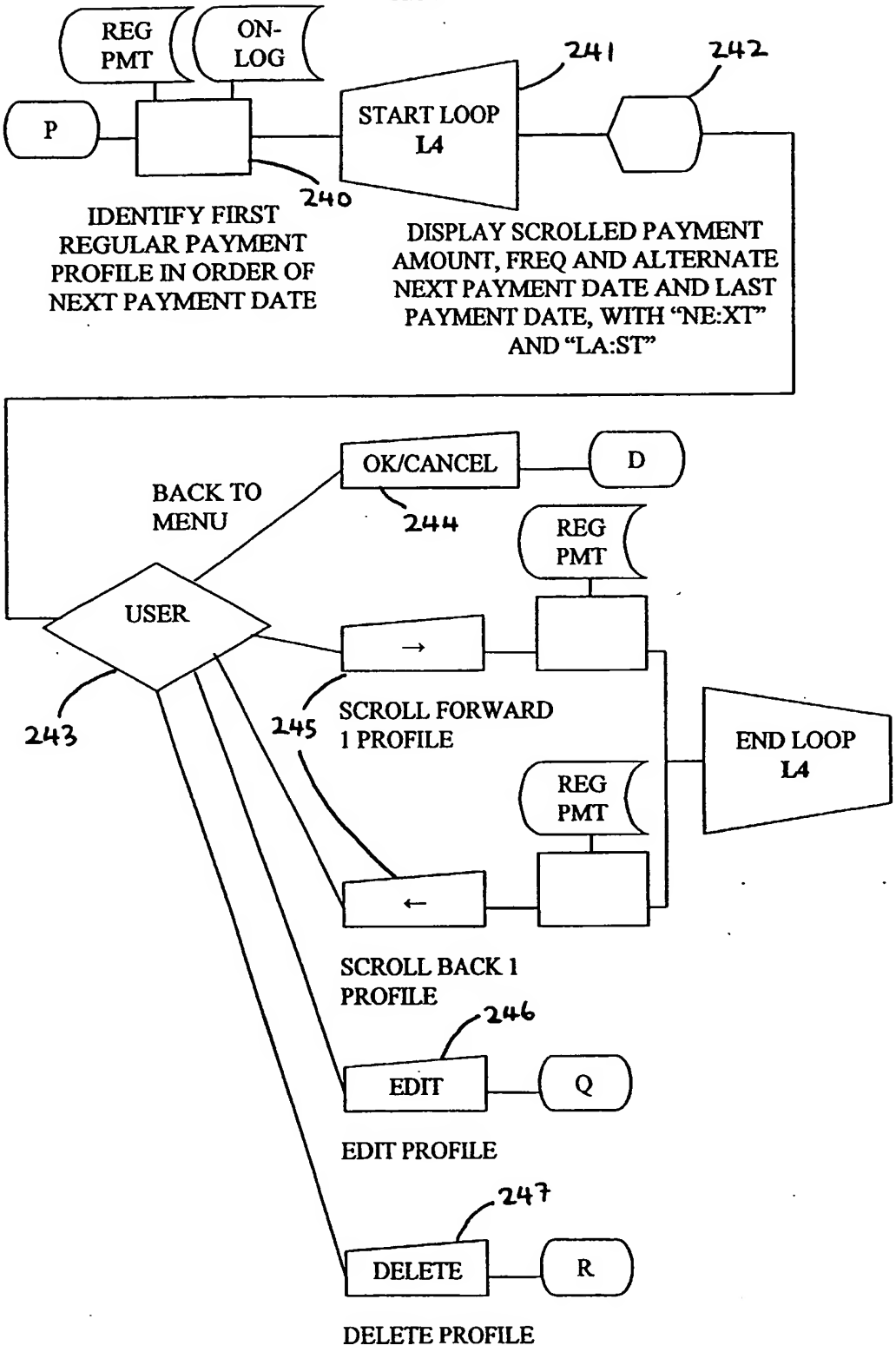
REG PMT
ON-LOG
P
240
START LOOP L4
241
242
IDENTIFY FIRST REGULAR PAYMENT PROFILE IN ORDER OF NEXT PAYMENT DATE
DISPLAY SCROLLED PAYMENT AMOUNT, FREQ AND ALTERNATE NEXT PAYMENT DATE AND LAST PAYMENT DATE, WITH "NE:XT" AND "LA:ST"
OK/CANCEL
D
244
BACK TO MENU
REG PMT
USER
→
243
245
SCROLL FORWARD 1 PROFILE
END LOOP L4
REG PMT
←
SCROLL BACK 1 PROFILE
246
EDIT
Q
EDIT PROFILE
247
DELETE
R
DELETE PROFILE

FIG. 5(r)

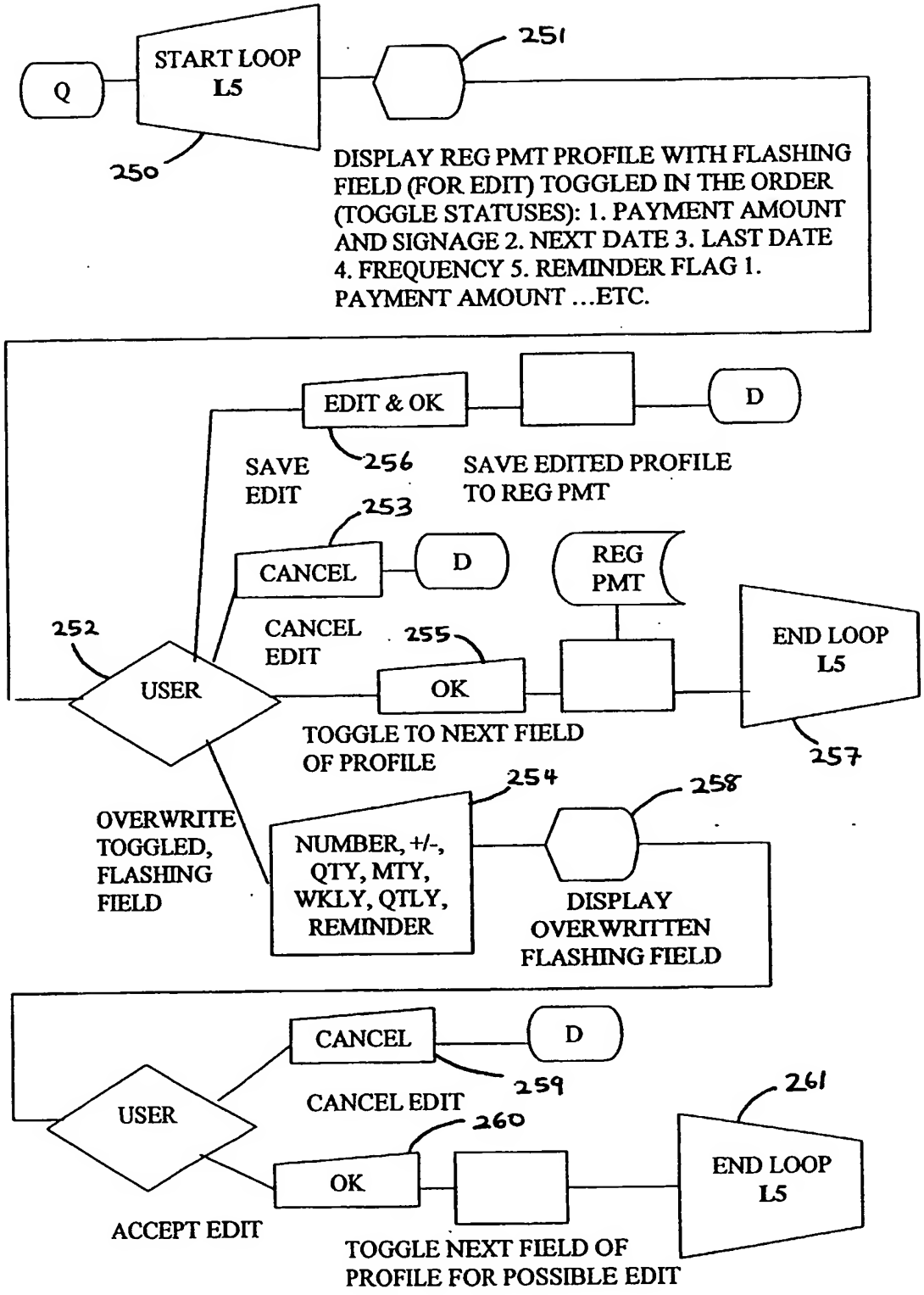
Q
START LOOP
L5
250
251
DISPLAY REG PMT PROFILE WITH FLASHING FIELD (FOR EDIT) TOGGLED IN THE ORDER (TOGGLE STATUSES): 1. PAYMENT AMOUNT AND SIGNAGE 2. NEXT DATE 3. LAST DATE 4. FREQUENCY 5. REMINDER FLAG 1. PAYMENT AMOUNT ...ETC.
EDIT & OK
D
256
SAVE EDIT
SAVE EDITED PROFILE TO REG PMT
253
CANCEL
D
REG PMT
252
USER
CANCEL EDIT
255
OK
END LOOP
L5
257
TOGGLE TO NEXT FIELD OF PROFILE
254
258
OVERWRITE TOGGLED, FLASHING FIELD
NUMBER, +/-, QTY, MTY, WKLY, QTLY, REMINDER
DISPLAY OVERWRITTEN FLASHING FIELD
CANCEL
D
259
USER
CANCEL EDIT
260
261
OK
END LOOP
L5
ACCEPT EDIT
TOGGLE NEXT FIELD OF PROFILE FOR POSSIBLE EDIT

FIG. 5(s)

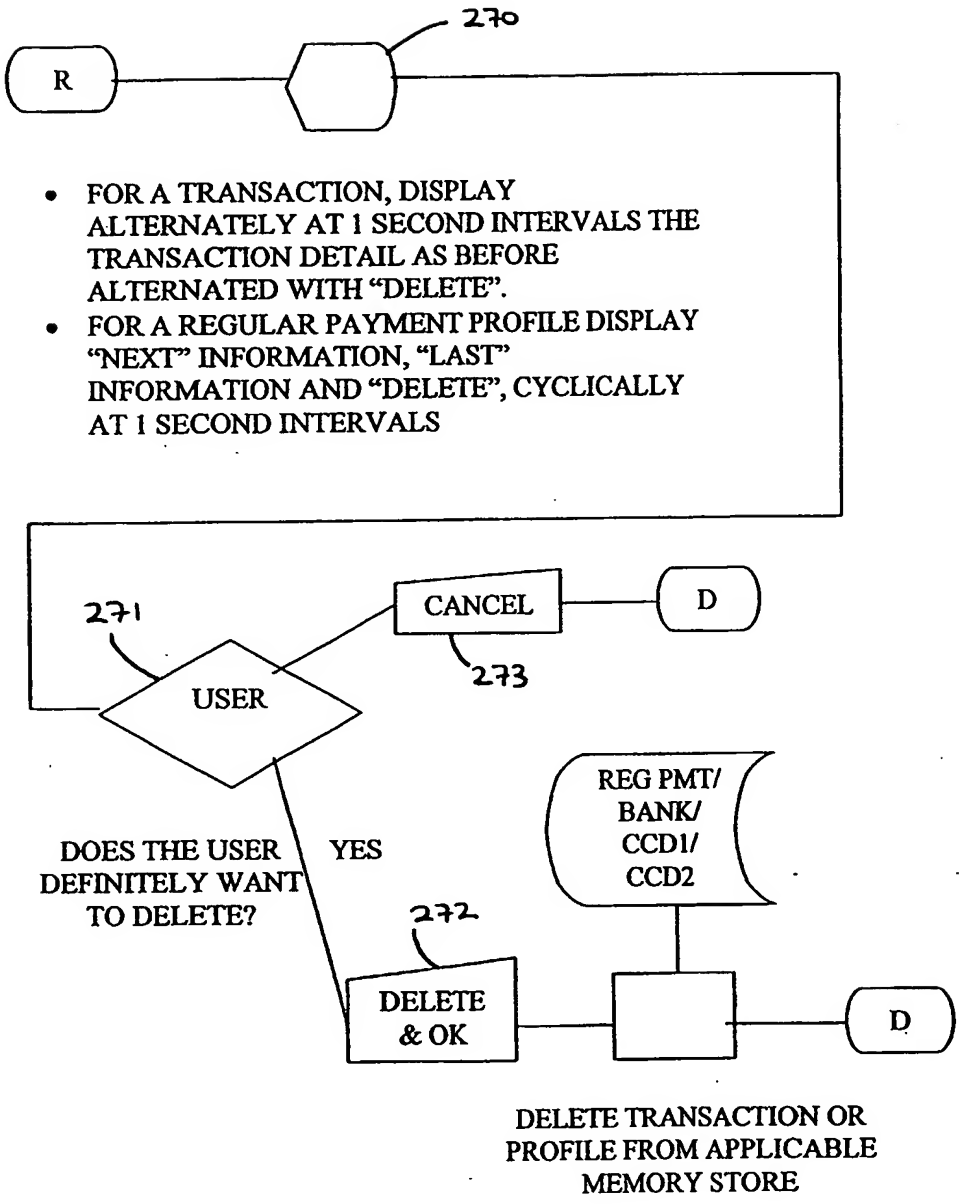
270
R
• FOR A TRANSACTION, DISPLAY ALTERNATELY AT 1 SECOND INTERVALS THE TRANSACTION DETAIL AS BEFORE ALTERNATED WITH "DELETE".
• FOR A REGULAR PAYMENT PROFILE DISPLAY "NEXT" INFORMATION, "LAST" INFORMATION AND "DELETE", CYCLICALLY AT 1 SECOND INTERVALS
271
CANCEL
D
273
USER
REG PMT/ BANK/ CCD1/ CCD2
DOES THE USER DEFINITELY WANT TO DELETE?
YES
272
DELETE & OK
D
DELETE TRANSACTION OR PROFILE FROM APPLICABLE MEMORY STORE

FIG. 5(t)

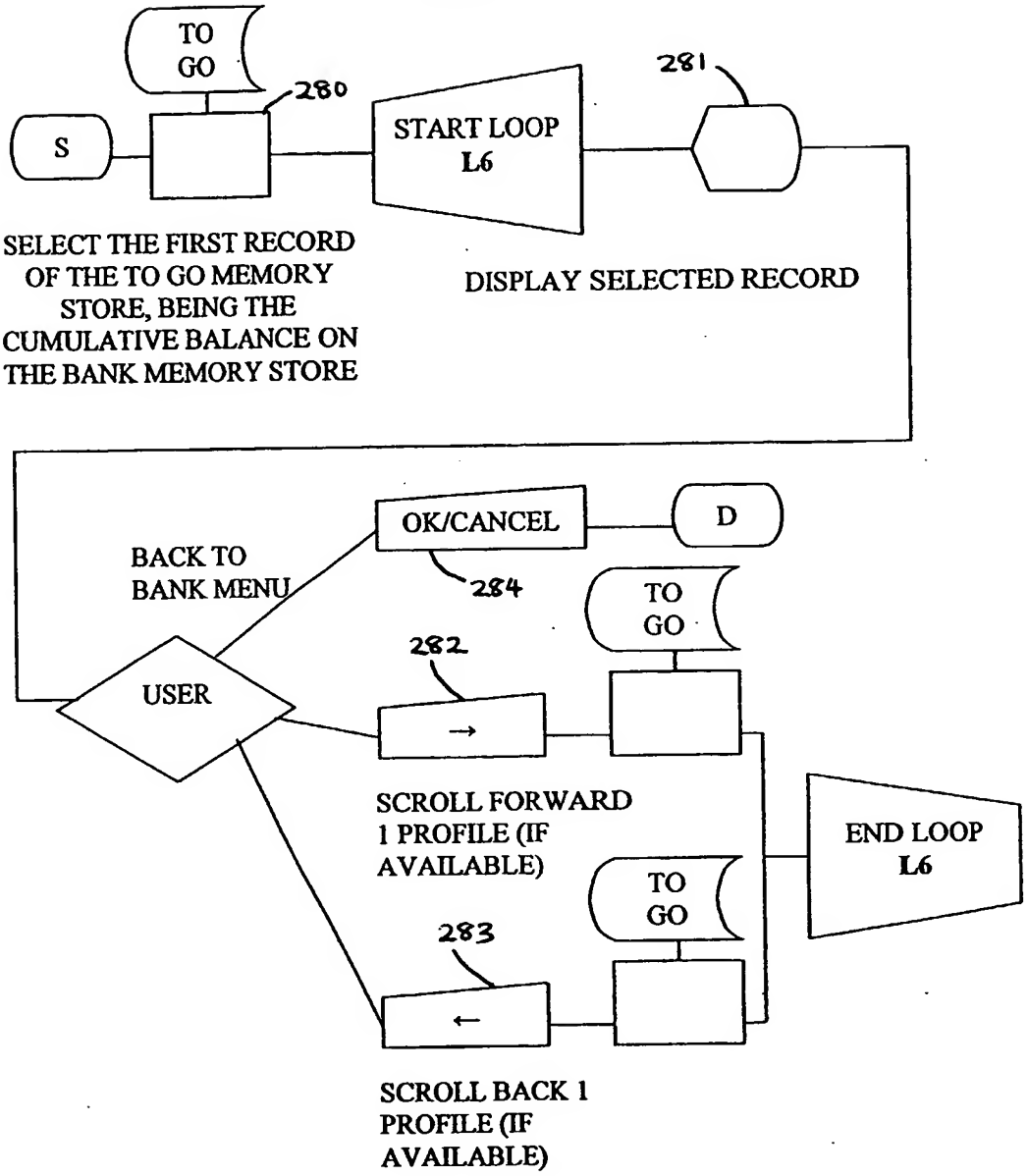
TO GO
280
S
START LOOP L6
281
SELECT THE FIRST RECORD OF THE TO GO MEMORY STORE, BEING THE CUMULATIVE BALANCE ON THE BANK MEMORY STORE
DISPLAY SELECTED RECORD
OK/CANCEL
D
284
BACK TO BANK MENU
TO GO
282
USER
→
SCROLL FORWARD 1 PROFILE (IF AVAILABLE)
END LOOP L6
TO GO
283
←
SCROLL BACK 1 PROFILE (IF AVAILABLE)

FIG. 5(u)

2387930

ELECTRONIC ORGANISER

Recent years have seen a steady move away from the direct usage of cash by individuals both as a means of receiving salary and other income as well as a means of spending. Most people nowadays receive income through direct bank transfer (typically an employer will use BACS to credit payroll to employees' bank accounts) and expend these funds by means of ATM withdrawals, personal cheques, debit cards and regular standing orders and direct debits. In addition most people regularly use credit cards for personal spending, which they repay periodically from their bank account.

This increased computerisation of banking and credit, and more widespread use of credit, has made it difficult for many individuals to keep track of their personal finances when compared with the physicality of cash. It is all too easy to spend more money than the amount in one's account or credit limit, particularly when one is a frequent user of debit cards, ATMs, credit cards and personal cheques. This commonly leads to unauthorised breaches of overdraft limits and associated bank charges as well as the embarrassment of having one's credit card refused at a retailer. In addition, it is common for people at one time or another to be surprised by their bank and credit card statements at the end of the month. Of course banks rarely make mistakes and most people trust banks not to make mistakes, but people often privately question transactions on their statements without being confident enough to take matters further in the sure knowledge that an error has occurred.

To address the above the prior art has been for individuals to suffer the inconvenience of having to use notebooks, chequebook stubs and pencils at the point of each transaction, having to retain wallets full of card receipts and having to perform regular bookkeeping and bank account reconciliation processes in order to keep abreast of where they are against their financial budgets and limits. These processes are time consuming and can be surprisingly complex. Typically they include totalling withdrawals and payments, factoring automated payment commitments including standing orders and direct debits, checking payment timings against the next expected salary receipt, checking bank statements for un-cleared cheques and cash machine withdrawals, and referring to one's bank overdraft and credit card limits in order to understand the margin available before one has no more funds available.

In addition, despite the more widespread use of direct debits and standing orders, many people prefer to make monthly regular payments such as mortgage repayments and council tax payments by cheque or cash either by post or using a paying-in book at a bank or post office counter. However, it is common for people to forget to make these essential payments on time, which can then lead to people spending their money on other items they cannot in fact afford. In extreme cases this can impact on peoples' ability to cover essential bills and ultimately their credit worthiness can suffer. To address this problem the prior art has been to use, at best, manual diary or calendar notes and, at worse, rely on memory or even creditor reminder letters. However neither of these mechanisms provides a particularly robust or satisfactory means to safeguard control over regular "manual" payments of these essential bills.

In realising the various disadvantages to the prior art, the present invention utilises an easy-to-use, portable, electronic financial calculator and planner that is capable of

overcoming the various disadvantages of the prior art. The present invention provides a convenient, instantaneous, accurate, up-to-date means of recording and tracking the amounts and timings of what the user has actually spent and received, the resultant balances on his bank account and credit cards, and what he has left to spend between now and his next major income receipt (i.e. usually his salary), within his personal budget, taking into account future commitments including standing orders and direct debits as well as overdraft and credit limits. The present invention also provides an independent record of transactions as a means to validate monthly bank and credit card statements in order to detect fraud and bank error. In addition, the present invention provides a robust reminder facility for regular manual payments, which is automatically activated as and when these payments fall due. The present invention therefore gives one greater peace of mind and confidence as to the state of one's personal financial affairs.

Accordingly the present invention provides a portable electronic calculating device having a personal financial planning function incorporated with a calendar function that is configured to assist with the personal financial planning function,

wherein the device includes means for inputting details of transactions, including date-related information and financial amount information,

wherein the device is adapted to conduct processing of the financial amount information based on the date-related information.

Preferably, the device is constructed in size and shape such that it can be located in a manner desirably convenient for common use. As such it is envisaged that the device would be housed or incorporated into a bespoke wallet allowing co-storage with the user's credit, debit, ATM and cheque guarantee cards so that the user has ready access to the device when using his primary forms of payment.

The present invention will become more fully understood from the detailed description given below and the accompanying drawings. The detailed description given represents a preferred embodiment of the present invention and is given by way of illustration only and not intended to limit the present invention, which may take a number of other forms such as:

- The invention may differ in size, physical layout and presentation.
- The detailed logic and circuitry may be assembled differently, even though it achieves the same functional results.
- The invention may have differing functional scope such as the ability to monitor multiple bank accounts, savings accounts, more or less than two credit cards.
- The invention may be incorporated into an alternative portable device. For example it may represent add-on functionality to a broader functioned portable device such as an electronic organiser, mobile phone or watch.

The preferred embodiment of the present invention will now be described with reference to the accompanying drawings in which:

FIG. 1 illustrates the physical overview of the preferred embodiment of the present invention.

FIG. 2 illustrates a block diagram of the circuit utilised in the present invention.

FIG. 3 illustrates the layout of the keyboard of the embodiment illustrated in FIG 1.

FIG. 4 illustrates the layout of the visual display screen of the embodiment illustrated in FIG. 1.

FIGS. 5(a) to 5(u) illustrates flowcharts of the processes carried out by the present invention.

The above-mentioned drawings will be described in detail in the following detailed description.

FIG. 1 represents the physical overview of the preferred embodiment of the present invention. In FIG. 1 the portable electronic device **1** is of the size and shape such that it fits into a transparent plastic covered pocket **2** within a wallet **3** shown unfolded. The wallet is also used to hold banknotes **4** and credit and debit cards **5** as would a regular, standard wallet. This enables the device to be located with the user's main personal financial payment methods and so is particularly convenient for user operation. This portable electronic device **1** includes a keypad **6** and display screen **7**. The keypad **6** is utilised to input information and commands from the user to the device. The display screen **7** displays variables associated with the user input and outputs from operations performed by the device in response to user commands. Both the keypad inputs and display screen outputs of the device are further described with respect to the keypad layout FIG. 3, the visual display screen layout FIG. 4 and the process flowcharts FIGS. 5(a) to 5(u).

FIG. 2 illustrates a block diagram of the circuit utilised in the preferred embodiment of the present invention as described in FIG. 1. In the preferred embodiment of the present invention the display screen **7** is represented by a liquid crystal display device **10**. This liquid crystal display device **10** is connected to a liquid crystal display controller **11** that controls the displaying of information upon the liquid crystal display device **10**. The liquid crystal display controller **11** receives power from a battery **18**. The battery **18** also supplies power to a clock module **13**, ROM (read only memory) **16** and RAM (random access memory) **17**. The clock module **13** provides day, date and time measurement as well as clock pulses to the CPU (central processing unit) **12** to assist the CPU **12** in carrying out the instructions and operations of the present invention. The clock **13** can be adjusted for the correct day, date and time by the user operating adjustment switches **14** located in recessed holes in the device case using a suitably fine object such as a biro. The mathematical relationships and operating rules utilised by the CPU **12** in carrying out the calculations and operations of the present invention are stored in the ROM **16**. Information and instructions utilised in the calculations and operations of the CPU **12** are input through the keypad **15** and temporarily stored in the RAM **17**. The RAM **17** is also used to provide the memory capacity to store transactional and user programmed inputs as described in more detail in FIG 5(a) symbols **30** through to **38**. These devices are linked together through a busbar line connection **19** that permits the passage of information and instructions between the relevant components connected. The CPU **12** is also connected to the liquid crystal display controller **11** through the busbar **19** in order to supply the liquid crystal display controller **11** with information to be displayed on the liquid crystal display device **10**. Electronics associated with the battery **18** provide low power detection that warns the user on the face of the liquid crystal display device **10** when the battery needs to be changed (see FIG. 4 **D9**). These electronics also provide capacitor charge or equivalent functionality to maintain memory content for RAM **17** and settings for the clock **13** for a short time whilst the battery **18** is changed.

FIG. 3 illustrates a detailed layout of the keypad **6** of the preferred embodiment of the present invention as described in FIG. 1. This section gives merely an overview of the purpose of each key. The precise functions of these keys are described in thorough detail in relation to the user operations and commands in the process flowcharts FIGS. 5(a) to 5(u). In FIG. 3 the keypad features twenty keys, each having abbreviated description lettering situated on the face of the key button. Some of the key buttons also have abbreviated description lettering situated above them. These keys have two distinct uses. The key **K1** represents the function key which, when pressed, allows the user to access the key functions described in lettering above the key buttons with the next (only) key entry. For example, key **K2** represents the command to switch the device on, however, pressing **K1** followed by **K2** allows the user to access the key function **K3** that switches the device off. Keys **K4** through to **K6** respectively, represent the various accounts that have been separated out and allow the user to record and monitor transactions on one bank account and two credit card accounts respectively. **K7** through to **K10** respectively, represent the various types that the user can select to describe a transaction. These are utilised by the user to provide descriptors, for future reference, to transaction records entered by the user and stored by the present invention. **K7** represents an ATM transaction, **K8** represents a bank debit card transaction or the use/debit of a credit card, **K9** represents a cheque transaction and **K10** represents a sundry (all other) transaction type. The keypad **6** also includes numeric keys for the digits 0 through 9 for the entering of numerical information as well as keys representing a decimal point, using **K11**, and credit-debit-credit signage toggling using key **K12**. The keypad includes keys **K13** and **K14** that allow the user to scroll through memorised transactions and other records in a chronological backward and forward direction respectively. Key **K15** represents a user okay that instructs the present invention to accept a keyed transaction or edit entry whereas key **K16** allows the user to cancel the keyed transaction or edit entry. Key **K17** represents a delete instruction to the present invention to remove a transaction or other record from memory. Key **K18** allows the user to move into regular payments mode, where future dated transactions may be programmed to memory and payment frequencies set using keys **K19, K20** and **K21** representing weekly, monthly and quarterly payment cycles respectively. Key **K22** allows the user to toggle a remind only flag for each programmed regular payment. When active, this flag instructs the present invention to provide a user reminder on payment due dates whereas, when not activated, the device will automatically debit/credit the bank account transactional memory on the due date. Key **K23** instructs the present invention to calculate forward to the programmed last day of the user's income cycle to compute the spend left on his bank account. Key **K24** represents an edit command and allows the user to edit programmed regular payment records, account overdraft and credit card limits and the last day of the users income cycle. Keys **K19, K20** and **K21** are also used to edit the frequency of the user's income cycle. Key **K25** represents a credit limit function key, which allows the user to view (and edit using key **K24** already discussed) the overdraft limit on his bank account and the various credit limits on his credit card accounts.

FIG. 4 illustrates a detailed layout of the display screen **7** of the preferred embodiment of the present invention as described in FIG. 1. The display screen in the preferred embodiment is a liquid crystal display that is configured into nine separate display sectors of proportional size as depicted in FIG. 4 **D1** through to **D9**. The tenth display sector **D10** is simply a "function" indicator which displays the character "F" when the

user selects the FCN key **K1** in order to inform the user that key functions described in lettering above the key buttons will be selected with the next (only) key entry. Each sector **D1** through to **D9** is split into two parts. There is an alphanumeric display part, which is activated by the device electronics in response to user actions, commands and general operation. There is also a sector heading with static text, which is located above the alphanumeric display part and which is activated when the alphanumeric display part is activated to provide a description of what the alphanumeric part represents. This section gives merely an overview of the purpose of each display sector. Detailed descriptions of each display sector output are given in relation to the user operations and commands in the process flowcharts FIGS. 5(a) to 5(u). The display sector **D1** displays a heading "ACCOUNT" and represents the bank or credit card account selected by the user. The display sector **D1** features four letters and displays either "MENU", before the user has selected either account key, "BANK", "CCD1" or "CCD2" in accordance with which of the keys **K4, K5** or **K6** the user has selected. The display sector **D2** displays a heading "TYPE" and represents the type of transaction that appears in the "transaction" display sector **D6** (see below). The display sector **D2** features three alphanumeric characters and displays one of "ATM", "DCD", "CHQ", "SDY", "CRL" or "REG". The display sector **D2** will display one of "ATM", "DCD", "CHQ" or "SDY" depending on which type descriptor the user selected when he recorded the transaction i.e. which of the keys **K7** through to **K10** was selected. The display sector **D2** will display "CRL" when the user selects the credit limit key CR LIM **K25**. The display sector **D2** will display "REG" when viewing a transaction, which the device automatically input to the account memory as a programmed automated regular payment. The display sector **D3** displays a heading "FREQ" and represents the frequency of either a regular payment or of the user's income cycle. The display sector **D3** features three alphanumeric characters and displays one of "WKY", "MTY" or "QTY", preceded by a single alphanumeric character, which may or may not be activated and represents a frequency multiplier. The frequency multiplier displays one digit of 2 through to 9 when active. The display sector **D3** is activated when the user is in regular payment mode or editing the user income cycle period. The "WKY", "MTY" and "QTY" displays represent weekly, monthly and quarterly cycles respectively. The frequency multiplier is activated only when the user selects a more complex frequency. For example biannual would be represented by "2 QTY", four weekly by "4 WKY", annual by "4 QTY" and so on. These frequencies are selected by the user when operating the present invention in the above-mentioned modes using keys **K19, K20** and **K21** respectively or, for complex frequencies, by selecting and holding the applicable key **K19, K20** and **K21** and then selecting the applicable numerical key for the required frequency multiplier. The display sector **D4** displays a heading "TIME" and represents either the current time, or the time of a displayed transaction where the user is scrolling through historical transaction records. In addition, in certain modes of operation the display sector **D4** is configured to display a payment sequence indicator describing whether the displayed transaction is the chronological first, next or last of a regular payment or other transactional sequence. The display sector **D4** features 6 elements being two alphanumeric characters, a colon, two alphanumeric characters and an am/pm indicator representing hours and minutes in a 12-hour clock format. For example at ten minutes to midnight, in general operation, the display sector **D4** would show "11:50 PM". However when, for example, the user is programming the present invention with regular payment dates, display sector **D4** will display "FR:ST", "NE:XT" and "LA:ST" at various points in the process to depict

first, next and last dates respectively. The display sector **D5** displays a heading "DATE" and represents either the current date or, for example when the user is browsing historical transaction records, the date of a displayed transaction. The display sector **D5** features 9 elements being a weekday indicator, two alphanumeric characters, a colon, two alphanumeric characters, a colon and two alphanumeric characters representing weekday, day, month and the last 2 digits of the year. For example on Monday 31st January 2002 the display sector **D5** would show "MON 31:01:02". The display sector **D6** displays a heading "TRANSACTION" and represents the "pounds and pence" or "dollar and cents" etc. amount and signage of the transaction being entered or scrolled by the user. The display sector **D6** features a nine alphanumeric character display with comma and decimal point separators allowing values ranging from 0.01 up to 9,999,999.99 to be recorded and displayed. Preceding the nine alphanumeric character display in display sector **D6** is a one-element display allowing signage (+ or -), representing account credit and debit to be attributed to the transaction displayed. The display sector **D7** displays a heading "CUM. BALANCE" and represents the amount and signage of the cumulative balance on the account being operated or scrolled by the user. The display sector **D7** features a format identical to display sector **D6** already discussed. The display sector **D8** displays a heading "REM" and represents the reminder flag indicator attributed to the programmed regular payment record being entered, scrolled or edited by the user. The display sector **D8** features a one alphanumeric character display which displays either "R" when the regular payment record is designated as a user reminder, or an "A" when the regular payment is designated an automated payment (e.g. a standing order or direct debit). These values are toggled by means of key **K22** when the present invention is operated in the applicable operating modes. The display sector **D9** displays a heading "BATT" and represents a low-battery warning indicator. The display sector **D9** features the wording "LOW" which is displayed when the electronics of the present invention detect that the battery power has fallen sufficiently to determine that the battery needs to be replaced.

FIG. 5(a) Illustrates the symbols used in the flowcharts, explained in the following paragraph so that the reader gains both an understanding of the conventions used in the flowcharts as well as the purpose of the memory stores utilised in the present invention. FIGS. 5(b) through to 5(u) illustrates the flowchart that shows the process carried out by the preferred embodiment of the present invention.

FIG. 5(a) illustrates the symbols used in the flowcharts described in FIGS. 5(b) through to 5(u). In FIG 5(a) the symbol **20** represents a flowchart terminator. Where this symbol appears in the flowchart it always contains a reference letter to enable the reader to navigate between different points of the flowchart. These are necessary because the flowchart is drawn across a number of separate pages and figures, each termed a flowchart "segment" in the remainder of this detailed description. The symbol **21** represents a device display instruction. Wherever this symbol appears in the flowchart, there will always appear adjacent a description of the specific display provided by the present invention on the display screen **7**. The symbol **22** represents a keypad input action by the user and where this symbol appears in the flowchart it always contains a key descriptor in accordance with the descriptors shown in FIG. 3 and described in the above paragraphs referenced **K1** through to **K25**. In the interests of conciseness and clarity, FIGS. 5(b) through to 5(u) and the accompanying detailed descriptions in the following paragraphs do not refer to the "K" references. Instead

the reader can rely on the key descriptors that appear within the key symbols in the figures and as described above in the description of FIG. 3. The symbol **23** represents a device operation. Wherever this symbol appears in the flowchart there will always appear adjacent a description of the specific operation carried out by the present invention. The symbol **24** represents a user decision operation. Wherever this symbol appears in the flowchart, there will always appear adjacent a description of the specific decision required by the user. Where the symbol **24** appears in the flowchart there will always be a single input, but a choice of outputs depending upon the action taken by the user. Because the path taken is dependent upon the decision taken by the user, the path is always selected by a user keypad input, represented as a symbol **22**. The symbol **25** represents a device decision operation. Wherever this symbol appears in the flowchart, there will always appear adjacent a description of the specific decision required from the present invention and the parameters and logic that determine the decision taken and subsequent path taken. Where the symbol **25** appears in the flowchart there will always be a single input, but a choice of outputs depending upon the outcome of the decision. The symbol **26** represents a device memory store. In the preferred embodiment of the present invention a device memory store physically consists of a RAM (random access memory) electronic device. Where this symbol appears in the flowchart it always contains a descriptor because there are nine different memory stores in the present invention. These are described in detail later in this paragraph because they appear as symbols **30** through to **38**. The symbol **27** represents an electronic clock and calendar module that is integrated into the present invention and provides functionality to provide up-to-date time, day and date information as part of transaction recording as well as acting as a timepiece for the user, as a bi-product benefit of the present invention. The symbol **28** represents the beginning of a loop in the flowchart. As such, it marks the beginning of a series of operations, decisions, user inputs and the like. Where this symbol appears in the flowchart it always contains an **"L"** reference because there are a number of loops within the flowchart. The symbol **29** represents the end of a loop in the flowchart and so the end of the series. It too always contains a reference. Symbols **28** and **29** always appear in pairs with a common reference. When the flowchart path meets a symbol **29** the path diverts "back" to the symbol **28** with the same reference. In this way the series between the pair of symbols may be passed through a number of times as a loop. However, within the series there will always be a decision symbol **24** or **25** which, when the parameters and conditions are such, which would typically happen after a number of iterations of the loop, will determine the path then taken outside the loop. The symbol **30** represents the on-log memory store that stores the time, day and date of the last occasion the present invention was switched off, and the time, day and date of the last occasion the present invention was switched on. The symbol **31** represents the regular payment memory store that the present invention uses to store a number of regular payment profile records. Each profile record represents a user-programmed regular payment or receipt such as a mortgage repayment, a salary receipt or a loan repayment. Each profile record consists of the next due date, the last due date, the frequency, the amount, the signage and a reminder flag record. The symbol **32** represents the reminder memory (REM) store and stores reminder flagged, due, regular payment record extracts transferred, using user programmed information, from the regular payment memory store and which have not been cleared by the user. Records held in the REM memory store consist of amount, signage, date due and frequency. The symbols **33** to **35** represent the bank and two credit cards account memory stores that hold transactional and computed cumulative balance records

(amounts and signage), time, date, type and, for regular payment automated entries, frequency. Each store can only hold a finite number of transactional records, as determined by the electronic components used. Therefore, each store is designed such that when it is full, the earliest transaction records are discarded on a "first in first out" basis, but the cumulative balance brought forward is adjusted to reflect the discarded transactions. The symbol **36** represents the last day memory store and holds the next "last day" of the user's income cycle. The next "last day" is automatically refreshed by the device according to the programmed last day and the frequency of the income cycle. For example if the user is paid salary on 24th of each month and the current date is 31st January 2002, then store **36** would hold a date of 23/02/02 and a monthly frequency record. When the 24th February 2002 is then reached, the device would refresh the last day memory store with 23/03/02 and so on. The device is also configured to allow the programming of weekday-calendar combinations such as the "last Friday of every month" or the "first Tuesday of each quarter". This is described in detail in FIG. 5(m). The symbol **37** represents the credit limit memory store and holds a credit limit figure for each account representing the credit limit on each of the credit card accounts and the overdraft limit on the bank account. The symbol **38** represents the "to go" memory store. It holds chronologically sequential due and future committed transactional records which are populated by the device when the user wants to check the amount of funds left in the user's income cycle and to browse the payments due to be paid before the user's next "last day".

FIG. 5(b) illustrates the flowchart segment for the *device switch-off* routine of the present invention. The routine is initiated by the user selecting the OFF key at which point the device updates the ON-LOG memory store with the time and date of device switch off **41** and then displays the current time, day and date as well as the low battery indicator if applicable **42**. These details are displayed in display sectors **D4, D5** and **D9** respectively. This is the status that the device adopts until such time as it is switched on. Although not specifically shown in FIG. 5(b) it would be desirable to incorporate an auto switch off function in a commercially produced device, which would be activated after a set period of inactivity in order to save battery power and to reduce the risk of accidental input to the device.

FIG. 5(c) illustrates the flowchart segment for the *device switch-on* routine of the present invention. The routine is initiated by the user selecting the ON key at which point the device updates the ON-LOG memory store with the time and date of device switch on **51**. The device then obtains the time the device was previously switched off from the ON-LOG memory store. The device then determines the time range between the last switch off and the current switch on, then retrieves any programmed regular payment reminders from the REG PMT memory store which are flagged as reminders (i.e. coded "R") and that fall due within this determined time range **52**. The programming and edit of the REG PMT memory store is covered in FIGS. 5(o) through to 5(s). The device then stores these retrieved records in the REM memory store **53**. The device then retrieves any programmed regular payment automatic payments from the REG PMT memory store, which are flagged as automated payments (i.e. coded "A") and that fall due within the same previously determined time range **54**. The device then applies these payments as transaction records to the bank memory store **55**. At the end of the *device switch-on* routine the device automatically enters the *user browsing reminder memory* routine, which is described in FIG 5(d). Although not specifically shown in FIG. 5(c) it would be desirable for a

commercially produced device to incorporate a protected switch-on feature. Such a feature could be achieved with the requirement to press two keys simultaneously and/or a numeric password function. Such a feature would protect both against accidental switch-on so saving battery power, as well as unauthorised access to the user's personal financial information.

FIG. 5(d) illustrates the flowchart segment for the *user browsing reminder memory* routine of the present invention. The device always automatically carries out this routine immediately after the *device switch-on* routine. This ensures that the user is reminded of due, outstanding manual regular payments and receipts every time he switches on the device. The routine begins and ends with start loop **L1 61** and end loop **L1 62** symbols respectively indicating that the routine represents a repetitive series. This series represents the user browsing and toggling through each and every stored reminder records held in the REM memory store **63**. In this context toggling means incrementing through the records stored in REM one by one. Only when the REM is either empty or fully toggled will the loop be broken, according to the device decision **64**, and the flowchart can be continued beyond this routine and flowchart segment into the next flowchart segment through terminator **65**. Assuming that the REM **63** is not empty, the series will move initially to display the oldest reminder held in REM **66**. The reminder record details displayed consist of the account (which will show as "BANK"), the type (which will show as "REG") the frequency, the payment due date, the amount and the reminder flag indicator (which will show as "R") displayed in display sectors **D1, D2, D3, D5, D6** and **D8** respectively. The user then makes a decision whether he wants to retain the reminder in REM for the next time the device is switched on and this routine is run, or whether he wants to cancel the reminder which would usually be decided by the user on the basis that the payment has been actioned **67**. The user retains the reminder by selecting the OK key, which then instructs the device to toggle forward to the next record in REM **68** without deleting the record he has just okayed. The user cancels the reminder by selecting and holding down the DELETE key and then selecting the OK key. This two key operation provides protection against accidental user deletion. This deletion key operation instructs the device to delete the record from REM **69** and then toggle forward to the next record in REM **68**. At this point the series is completed and flow reverts back to start loop L1 **61**. This loop series is repeated until the full contents of the REM have been viewed and actioned by the user in this way at which point the flowchart is continued into the next flowchart segment through terminator **65** as described earlier in this paragraph. The next flowchart segment is the *general menu mode* routine, which is described in FIG 5(e).

FIG. 5(e) illustrates the flowchart segment for the *general menu mode* routine of the present invention. The device always automatically carries out this routine immediately after the user has completed the *user browsing reminder memory* routine described in FIG. 5(d). The device displays the current time and date and the word "MENU" as well as the low battery indicator if applicable **71**. These details are displayed in display sectors **D4, D5, D1** and **D9** respectively. This is the status which the device adopts until the user makes a selection decision **72**. The user may decide to switch the device off **73**, or alternatively to perform an operation on either the bank account **74**, credit card 1 **75**, or credit card 2 **76**. The user selects one of these options using one of the keys OFF, BANK, CCD1 or CCD2 respectively. Each lead to different flowchart segments represented by FIG. 5(b), FIG. 5(f) and FIG. 5(g)

respectively as indicated by the references within the appropriate terminator symbols (note that the flowchart segments for both CCD1 and CCD2 selections are essentially identical and so are combined in FIG. 5(g)).

FIG. 5(f) illustrates the flowchart segment for the *bank menu mode* routine of the present invention. The device enters this mode when the user selects the BANK key in the *general menu mode* routine as described previously in FIG. 5(e). The device displays the current time and date, the word "BANK", the cumulative balance on the bank account as well as the low battery indicator if applicable **81**. These details are displayed in display sectors **D4, D5, D1, D7** and **D9** respectively. (NB. The reader should assume that in all modes of operation the low battery indicator would be activated where applicable. For the sake of conciseness this particular feature will not therefore be referred to in the rest of the detailed description). This is the status which the device adopts until the user makes a selection decision **82**. The user may decide to:

- Switch the device off by selecting the OFF key **83**,
- Go back to the *general menu mode* by selecting either the OK or CANCEL keys **84**,
- Record a transaction by pressing the appropriate type key ATM, CHEQ, DCRD or SUNDRY **85**,
- View or edit the credit limit on the bank account by pressing the CR LIM key **86**,
- Scroll historical transaction memory on the bank account by pressing the ← key **87**,
- Check the "spend left" on the account in the user's current income cycle by pressing the SPND LFT key **88**,
- Enter the regular payments mode by pressing the REG PMT key **89**.

Each selection leads to a different flowchart segment represented by FIG. 5(b), FIG. 5(e), FIG. 5(h), FIG. 5(i), FIG. 5(j), FIG. 5(l) and FIG. 5(o) respectively as indicated by the references within the applicable terminator symbols.

FIG. 5(g) illustrates the flowchart segment for the *credit card menu mode* routine of the present invention. This flowchart segment represents two separate but essentially identical routines; one routine for each of the two credit card accounts which the preferred embodiment of the present invention is configured for. The device enters this mode when the user selects either of the CCD1 or CCD2 keys in the *general menu mode*. The device displays the current time and date, the characters "CCD1" or "CCD2" as applicable, the cumulative balance on the applicable CCD1 or CCD2 account as well as the low battery indicator if applicable **91**. These details are displayed in display sectors **D4, D5, D1, D7** and **D9** respectively. This is the status which the device adopts until the user makes a selection decision **92**. The user may decide to:

- Switch the device off by selecting OFF **93**,
- Go back to the general menu mode by selecting either the OK or CANCEL key **94**,
- Record a transaction by selecting the appropriate type key ATM, CHEQ, DCRD or SUNDRY **95**,
- View or edit the credit limit on the account by pressing the CR LIM key **96**,
- Scroll transaction memory on the account by pressing the ← key **97**,
- Check the "spend left" on the account by pressing the SPND LFT key **98**.

Each selection leads to a different flowchart segment as represented by FIG. 5(b), FIG. 5(e), FIG. 5(h), FIG. 5(i), FIG. 5(j) and FIG. 5(n) respectively as indicated by the references within the appropriate terminator symbols.

FIG. 5(h) illustrates the flowchart segment for the *enter transaction* routine of the present invention. This routine applies equally to bank and credit card accounts, as well as to ATM, cheque, debit card and sundry transaction types as represented in FIGS. 5(f) and 5(g). However, the flowchart segment in FIG. 5(h) makes reference to these preceding user selections, which determine which bank or credit account memory the transaction is entered to and which type of transaction is reflected in the memorised transaction record. Throughout this flowchart segment the user has the choice to cancel the entry by pressing the CANCEL key which reverts the device back to the applicable bank or credit card menu mode as described in FIGS. 5(f) and 5(g). These decision choices are indicated **101** on FIG. 5(h) and such choices to cancel are common throughout the remaining flowchart segments and this detailed description. Since their occurrence are so widespread and their interpretation self explanatory, in the interest of conciseness and clarity the remaining descriptions will make limited reference to these decision options and consider the main flow of the flowchart assuming that the user does not wish to cancel the described operation. On entering the *enter transaction* routine flowchart segment the device displays the preceding, user selected account (i.e. "BANK", "CCD1" or "CCD2") and the previously user selected transaction type (i.e. "ATM", "CHEQ", "DCRD" or "SDRY") in the display sectors **D1** and **D2** respectively. In addition the device displays a negative symbol and zeros in display sector **D6** flashing at one-second intervals. This is shown in FIG. 5(h) at reference **102**. In the remainder of this description, wherever displays are explained as "flashing" the reader should assume a similar one-second flashing frequency. The user is then required to enter the transaction amount **103** and may toggle the signage to a positive receipt/credit transaction if required **104**. This user input overwrites the flashing figures and signage displayed in display sector **D6**, still flashing **105**. When the user then selects the OK key **106**, the input transaction remains in display sector **D6**, but no longer flashing, and the current time and date appears, flashing, in display sectors **D4** and **D5**. This is shown in FIG. 5(h) at reference **107**. The user then has the option of inputting a different date **108**, which is also displayed in a flashing manner as before **109**. The user then has the option of memorising the input transaction by selecting the OK key **110**, which then instructs the device to memorise the input transaction parameters into the applicable bank or credit account memory store **111**. The device then reverts back to the applicable bank or credit card menu mode **112** representing the same bank or credit card account to which the user has just memorised the transaction.

FIG. 5(i) illustrates the flowchart segment for the *credit limit* routine of the present invention. This routine applies equally to bank and credit card accounts, as represented in FIGS. 5(f) and 5(g). However, the flowchart segment in FIG. 5(i) makes reference to this preceding user selection, which determines which account the credit limit applies to. Upon entering this flowchart segment the device displays the preceding user-selected account (i.e. "BANK", "CCD1" or "CCD2") and the characters "CRL" in the display sectors **D1** and **D2** respectively. In addition the device displays, in display sector **D6**, a negative symbol and the amount stored in the CR LIM memory store for the selected account. This is shown in FIG. 5(i) at reference **121**. The user then has the option of inputting a different credit limit **122**,

which is then displayed in a flashing manner **123**, or exiting the credit limit routine by pressing OK or CANCEL **124**. If the user takes the option of inputting a different credit limit, this is memorised into the CR LIM memory store, overwriting the previously stored figure for that account, by the user selecting the OK key **125**. The device then reverts back to the applicable bank or credit card menu mode **126** representing the same bank or credit card account to which the user has just viewed or memorised the credit limit.

FIGS. 5(j) and 5(k) illustrate the flowchart segment for the *scroll transactions* routine of the present invention. This routine applies equally to bank and credit card accounts, as represented in FIGS. 5(f) and 5(g). However, the flowchart segment in FIGS. 5(j) and 5(k) makes reference to this preceding user selection, which determines which account memory store is scrolled. This flowchart segment also allows the user to select memorised transactions to be deleted and the *delete safeguard* routine flowchart segment is described in FIG. 5(t) and is reached through the terminator referenced **R**. Throughout the flowchart segment described in FIGS. 5(j) and 5(k) the device displays in the display sector **D1** the user selected account name (i.e. "BANK", "CCD1" or "CCD2") so that the user is able to distinguish which account memory he is scrolling. Upon entering this flowchart segment the device determines whether the particular account memory store is empty **130**. If it is, it will flash zeros in the display segment **D6** for three seconds before reverting back to the applicable bank or credit card menu mode **131** representing the same bank or credit card account to which the user has just attempted to scroll. Assuming however it is not empty, the device will display the chronologically latest transaction record from the applicable bank or credit card memory store **132**. The display will consist of the transaction type, the time of the transaction, the date of the transaction the amount of the transaction, as well as the cumulative balance on the account memory store up to and including the displayed transaction. These pieces of information are displayed in display sectors **D2, D4, D5, D6** and **D7**. In addition, for automated regular payment entries the frequency of the regular payment will be shown in display sector **D3**. The user then has a decision of whether he wants to:

- Go back to the appropriate bank or credit card menu mode by selecting either OK or CANCEL **133**,
- Delete the transaction by selecting the DELETE key **134** or
- Scroll back to the transaction chronologically preceding by selecting the "←" key **135**.

The delete option is referenced to the **R** terminator, which directs the flowchart to the *delete safeguard* routine with is explained in FIG. 5(t) covered later. The option decision to scroll back commences a loop **L2**, referenced **136**. Upon selecting the option to scroll back, the device checks whether there is a chronologically earlier transaction record preceding **137**. If there is not, the earliest transaction record (i.e. the one previously scrolled) will be displayed flashing, but instead of the time appearing in display sector **D4** the characters "FR:ST" will appear **138**. This display will flash for five seconds and then the device will revert back to displaying the transaction as before (i.e. without the flashing "FR:ST" but instead with the transaction date) and move to the beginning of the loop **L3** through the terminator **I** referenced **139**. Assuming there is an earlier record this will be scrolled and displayed **140** in the same manner as described above under reference **132**. The flowchart then moves to commence loop **L3** represented by the symbol referenced **141** in FIG 5(k). The user then takes a decision **142** whether to:

- Go back to the applicable bank or credit card menu mode,
- Delete the displayed transaction,
- Scroll back to the preceding transaction or
- Scroll forward to the subsequent transaction.

The decision to go back to the applicable bank or credit card menu mode is actioned by the user selecting either the OK or CANCEL keys **143**. The decision to delete the displayed transaction is actioned by the user selecting the DELETE key **144**. The decision to scroll back to the preceding transaction represents the end of loop **L2** referenced as **145** and continues the flowchart back to the beginning of loop **L2** referenced **136** in FIG. 5(j) and actioned by the user selecting the "←" key **135**. The decision to scroll forward to the subsequent transaction, which may be taken after a number of iterations of loop **L2**, is taken by the user selecting the "→" key **146**. This prompts the device to refer to the applicable bank or credit card memory store and check whether there is a subsequent transaction **147**. If there is not, the latest transaction record (i.e. the one previously scrolled) will be displayed flashing, but instead of the time appearing in display sector **D4** the characters "LA:ST" will appear **148**. This display will flash for five seconds and then the device will back to displaying the transaction as before (i.e. without the flashing "LA:ST" but instead with the transaction date) and move to the beginning of the loop **L2** through the terminator **I** referenced **149**. Assuming there is a subsequent record this will be scrolled and displayed **150** in the same manner as described above under references **132** and **140**. The flowchart then proceeds to complete loop **L3** as represented by the symbol referenced **151** in FIG 5(k). This then reverts the flowchart to the start of loop **L3** referenced **141** in FIG 5(k) the next action being the user decision **142** described above. The loops **L2** and **L3** are iterated through in this way until the user decides to exit the *scroll transactions* routine either by deleting a scrolled transaction record or by selecting the OK or CANCEL keys.

FIG. 5(l) illustrates the flowchart segment for the *bank account spend left* routine of the present invention. The user enters this routine by selecting the SPND LFT key from the *bank menu mode* routine of the present invention as described in FIG 5(f). Upon selecting this option the device refers to the ON-LOG and LAST DAY memory stores to calculate from programmed parameters the next last day of the user's income cycle and then identify the date range between when the device was last switched on and the next last day of the user's income cycle **160**. The programming of the last day parameters is described in FIG. 5(m). The device then examines the REG PMT profiles **161** to identify programmed automated regular payments and timed reminders that are due for payment or receipt in the date range. The operation of the bank regular payment functionality is described later in FIGS. 5(o) to 5(s). Following this, in the operation referenced **162**, the device calculates forward the balance on the bank account on the next last day by reference to:

- The current cumulative balance on the bank account memory store,
- Anticipated regular payments (both automated and reminders) calculated in operation **161**
- Any post-dated payments on the bank account memory store in the date range calculated in operation **160**,
- Any overdue payments or receipts stored as uncleared user reminders in the REM memory store.

These transactional records are then stored in the TO GO memory store. The balance calculated in operation **162** therefore represents the forward balance on the bank

account at the next last day assuming no further account transactions apart from the settlement of all regular payments (manual and automated) on the due dates including those already overdue. This effectively represents the amount in the user's account available to spend before the account becomes overdrawn. The device then adjusts this figure to take into account the user's bank overdraft by adding the value held in the CR LIM memory store **163**. The set up of the CR LIM record has already been described in FIG. 5(i). The device then displays the figures calculated in operations **162** and **163** alternately at one-second intervals in display sector **D7** and displays the characters "BANK" in display sector **D1**. A positive amount denotes the amount the user has left, whereas a negative amount indicates a shortfall. In addition, as the device alternates the figure calculated in operation **163**, the display sector **D2** displays the characters "CRL" and the display sector **D6** the credit limit amount stored in the CR LIM memory store. This informs the user that this alternate display represents the "spend left" taking into account the bank overdraft, and how much that overdraft is. This is shown in the FIG. 5(l) as reference **164**. The user then cancels this display by either selecting the OK key **165**, which reverts the device to the *bank menu mode*, or selecting the EDIT key **166**, which enables the user to programme the parameters that determine the last day of the user's income cycle. This is described in FIG. 5(m). The user may also decide to scroll through the future commitments used to calculate forward in operation **162** described above and stored in the TO GO memory store. This is achieved by selecting the "→" key **167** and is entitled the *scroll spend to go* routine, which is described in FIG. 5(u).

FIG. 5(m) illustrates the flowchart segment for the *programme last day* routine of the present invention. The user enters this routine by selecting the EDIT key from the *bank account spend left* routine of the present invention as described in FIG 5(l). Upon selecting this option the device displays the characters "BANK" in display sector **D1**, the next last day in the display sector **D5** and the programmed user income cycle frequency, flashing, in the display sector **D3**. This is shown as reference **170** in FIG. 5(m). The user may then amend the frequency by selecting either the WKLY, MTLY or QTLY keys **171** and selecting the OK key **172**, or leave the frequency unchanged by selecting the OK key **173**, or exit the edit altogether by selecting CANCEL. The user also has the option to select a complex frequency as described in the description of FIG. 4. This is not described here to avoid repetition and for the sake of conciseness. On selecting the OK key the device displays the characters "BANK" in display sector **D1**, the programmed user income cycle frequency, no longer flashing, in the display sector **D3** and the next last day date, flashing, in the display sector **D5**. This is shown as reference **174** in FIG. 5(m). The user may then accept the amended frequency with the next last day unchanged by selecting OK **175**, which then updates the parameters to the LAST DAY memory store **176** and reverts the device to the *bank menu mode*. Alternatively the user may overwrite the next last day by keying a new date using the numeric keys **177**. The device should be configured to manage weekday and calendar combinations as follows:

- The first Monday, Tuesday, Friday of the next month, quarter etc. would be programmed as the 41st, 42nd and the 45th,
- The second as the 51st, 52nd and the 55th,
- The fourth as the 71st, 72nd and the 75th,
- The last weekday of the month (which would usually coincide with the 4th) as the 91st, 92nd and the 95th.

For example if it is the 31st of January 2002, a Wednesday, and the user normally is paid on the last Friday of the month, he would enter 95/02/02 on a MTY frequency. If he received a two-monthly pension on the second Tuesday of each months January March, May, July, September and November, he would enter 52/03/02 on a 2 MTY frequency. When the user has entered the new next day date the device displays the characters "BANK" in display sector **D1** the next last day and the programmed user income cycle both flashing in the display sectors **D5** and **D3** respectively. This is shown as reference **178** in FIG. 5(m). The user then has the option to cancel the edit, or to accept the edit by selecting OK **179**, which then updates the parameters to the LAST DAY memory store **180** and reverts the device to the *bank menu mode*.

FIG. 5(n) illustrates the flowchart segment for the *credit card account spend left* routine of the present invention. The user enters this routine by selecting the SPND LFT key from the *credit card menu mode* routine of the present invention as described in FIG 5(g). Upon selecting this option the device refers to the current cumulative balance on the applicable credit card memory store CCD1 or CCD2 **190**. The device then compares this balance with the applicable credit card credit limit by subtracting the applicable value held in the CR LIM memory store **191**. The set up of the CR LIM record has already been described in FIG. 5(i). The device then displays the figure calculated in operation **191** in display sector **D7** and displays the applicable characters "CCD1" or "CCD2" in display sector **D1**. This is shown in the FIG. 5(n) as reference **192**. The user then cancels this display by either selecting either the OK or CANCEL key **193**, which reverts the device to the applicable *credit card menu* mode. This routine does not consider post-dated payments that the user may have set up. For example the user may have sent a cheque to the credit card company a day or two earlier and programmed the credit transaction timed six days hence to factor in postage and processing time. These are not taken into account because the credit card company will not yet be aware of, or have credited the payment. To include such post-dated payments runs the risk of the credit card being refused when the user tries to use it believing that he has more credit available than is actually been reflected on his account with the credit card company.

FIG. 5(o) illustrates the flowchart segment for the *bank regular payment menu mode* routine of the present invention. The user enters this routine by selecting the REG PMT key from the *bank menu mode* routine of the present invention as described in FIG 5(f). Upon selecting this option the device displays the characters "BANK" and "REG" in display sectors **D1** and **D2** respectively, and shows flashing zeros and negative signage in display sector **D6**. This is shown in the FIG. 5(o) as reference **200**. The user may cancel this routine by either selecting either the OK or CANCEL key **201**, which directs the device back to the *bank menu mode*. Alternatively, the user may select a regular payment amount and signage **202** as the first inputs to programme a new regular payment profile. Instead he may select the scroll forward key marked "→" **203** as the first input to scroll through (and then possibly to subsequently edit or delete) regular payment profiles previously programmed and memorised by the device. The setting up of a new regular payment profile is described in FIGS. 5(p) and 5(q). The scrolling through of regular payment profiles is described in FIG. 5(r). The edit and delete of scrolled regular payment profiles are described in FIGS. 5(s) and 5(t) respectively.

FIGS. 5(p) and 5(q) illustrate the flowchart segment for the *programme new regular payment profile* routine of the present invention. The user enters this routine by keying the numerical amount and signage of the regular payment he wishes to programme, when in the *bank regular payment menu mode* of the present invention as described in FIG 5(o). Upon entering this routine the device displays the characters "BANK" and "REG" in display sectors **D1** and **D2** respectively, and shows flashing amount and signage, as keyed by the user, in display sector **D6**. This is shown in FIG. 5(p) as reference **210**. The user may then cancel this routine by either selecting the CANCEL key **211**, which directs the device to the *bank menu mode*, or he may accept the entered amount by selecting the OK key **212**. The display will then display as before, but with the entered amount and signage, no longer flashing, and with a "MTY" frequency flashing in the display sector **D3** as a default monthly frequency. This is shown in FIG. 5(p) as reference **213**. The user then has the option of keying a different frequency by pressing either of the frequency keys WKLY, MTLY or QTLY **214** (or a complex frequency as already described in FIGS. 4 and 5(m)) and this will replace the flashing characters in display sector **D3** as shown in the FIG. 5(p) as reference **215**. The user then selects the OK key **216** to accept the monthly, or keyed, frequency and the display will then display as before, but with the selected frequency no longer flashing, and with the characters "FR:ST" and zeros, both flashing, in the display sectors **D4** and **D5** respectively. This is shown in the FIG. 5(p) as reference **217**. The user is then required to key the first date, representing the date of the first payment of the regular payment, which he keys using the appropriate numeric key entry **218**. The user has the ability to enter calendar/weekday combinations such as "the last Friday of the month" as described previously in the *programme last day* routine in FIG. 5(m). The keyed date will then replace the flashing zeros in display sector **D5** as shown in the FIG. 5(p) as reference **219**. The user then selects the OK key **220** to accept the keyed first date and the display will then display the input amounts, signage and frequency already input, but with the characters "LA:ST" and zeros, both flashing, in the display sectors **D4** and **D5** respectively. This is shown in the FIG. 5(q) as reference **221**. The user is then required to key the last date, representing the date of the last payment of the regular payment, which he keys in the same way as before using the appropriate numeric entry **222**. The keyed date will then replace the flashing zeros in display sector **D5** as shown in the FIG. 5(q) as reference **223**. The user then selects the OK key **224** to accept the keyed last date and the display will then display the input amounts, signage and frequency already input, but with the character "A" flashing in the REM field in display sector **D8**. This is shown in the FIG. 5(q) as reference **225**. The "A" represents the device default selection of the regular payment as an automated type flag. The user may then toggle this flag to a reminder only regular payment with display character "R" and back again and so on, by keying the "REMIND" key **226**. This will alter the display sector **D8** (although this display step is not specifically shown in the FIG. 5(q)). The user then keys OK when he is satisfied with the selection made **227** and the device then displays the characters "BANK" and "REG" in display sectors **D1** and **D2** respectively, the keyed amount and signage in display sector **D6** and the selected REM flag in display sector **D8**. In addition the device alternates at one-second intervals between showing the keyed first date and the keyed last date, together with the characters "FR:ST" and "LA:ST" in display sectors **D5** and **D4** respectively. This is shown in the FIG. 5(q) as reference **228**. The user may then store this regular payment profile in the REG PMT memory store **229** by selecting OK **230** once more,

or he may alternatively cancel the entered profile by selecting CANCEL **231.** The device then reverts to the *bank menu mode.*

FIG. 5(r) illustrates the flowchart segment for the *scroll regular payment profiles* routine of the present invention. The user enters this routine by keying the scroll forward key signified by the "→" symbol in the b*ank regular payment menu mode* of the present invention as described in FIG 5(o). Upon entering this routine the device identifies the chronologically next due regular payment by reference to the most recent switch on date and programmed regular payment profiles stored in ON-LOG and REG PMT memory stores respectively. This operation is referenced as **240** in FIG. 5(r). The flowchart then enters the start of loop **L4** referenced as **241** before it displays the characters "BANK" and "REG" in display sectors **D1** and **D2** respectively, displays the applicable REM flag in display sector **D8,** displays the applicable amount and signage in display sector **D6,** displays the applicable frequency in display sector **D3** and alternates at one second intervals between showing the next date and the last date of the regular payment profile, together with the characters "NE:XT" and "LA:ST" in display sectors **D5** and **D4** respectively. This is shown in the FIG. 5(r) as reference **242.** The user then has a decision **243** to either:

- Key OK or CANCEL to return to the bank menu mode **244,**
- Scroll forward/back to the regular payment profile which is chronologically next/previous in terms of the next due payment, by keying either the "→" or the "←" key respectively **245,**
- Edit the profile by keying EDIT **246,**
- Or delete the regular payment profile, and thus cancel any future automated payments or reminders by keying DELETE **247.**

Keying either of the scroll keys **245** directs the device to scroll the regular payments memory store and to then proceed to the end of the loop **L4** thus directing the flowchart back to the start of the loop **L4** and a display operation as described above reference **242.** The edit command directs the device to the *edit regular payment profile* routine described in FIG. 5(s). The delete command directs the device to the *delete safeguard* routine described in FIG. 5(t). The *delete safeguard* routine also applies to the deletion of memorised transactions as detailed earlier in FIGS. 5(j) and 5(k).

FIG. 5(s) illustrates the flowchart segment for the *edit regular payment profile* routine of the present invention. The user enters this routine by keying the EDIT key when he has scrolled to the regular payment profile he wishes to edit, whilst in the *scroll regular payment profiles* routine of the present invention as described in FIG 5(r). Upon entering this routine the flowchart enters the start of loop **L5** referenced as **250** before the device displays the characters "BANK" and "REG" in display sectors **D1** and **D2** respectively. The device also displays the applicable amount and signage, flashing, in display sector **D6** as referenced **251.** This represents the first toggle status in the flowchart description for the display operation **251** and termed "1. Payment amount and signage". The user then has a decision **252** from the following options:

- To cancel the edit by selecting the CANCEL key **253,** which then directs the device to the *bank menu mode.*
- To input a different payment and/or signage using the appropriate numerical and signage keys followed by OK **254.** The keys that apply to this operation will vary depending upon the toggle status upon subsequent iterations of loop **L5** (see below).

- To toggle forward (without editing) to the subsequent toggle status in the flowchart description for the display operation **251** (i.e. toggle status "2. Next date") by the user selecting the OK key **255**.
- To save the edited profile to REG PMT memory store by selecting and holding the EDIT key whilst selecting the OK key **256**. This will apply after the required iterations of loop **L5** (described below) and user edits of applicable fields **254**.

Upon toggling to the second toggle status "2. Next date", the flowchart reverts via the end loop **L5 257** to the start of the loop **L5 250**. The device then displays, as referenced **251**, the characters "BANK" and "REG" in display sectors **D1** and **D2** respectively as before in the first toggle status. However, instead of displaying the payment amount and signage of the regular payment, the device displays the characters "NE:XT" in the display sector **D4** and the next payment date, flashing, in the display sector **D5** for possible edit. In this way the user can toggle through the five statuses, in a cyclical fashion, as described in the flowchart description for the display operation **251** in order to call up, flashing, in the applicable display sectors the various fields for edit. As the required fields are called up in this way the user may overwrite them using the appropriate key **254**. As each is overwritten it is displayed, still flashing, in the applicable display sector **258** at which point the user may cancel the edit **259** or accept the edit by selecting the OK key **260**. When the user selects the OK key after an edit, the device toggles to the next status and the flowchart reverts via the end loop **L5 261** to the start of the loop **L5 250**. In this way one, some or all of the fields within the same regular payment profile may be edited before the user accepts the edit by keying as described in reference **256**.

FIG. 5(t) illustrates the flowchart segment for the *delete safeguard* routine of the present invention. The user enters this routine by keying the delete key when he has scrolled to the regular payment profile or transaction record he wishes to delete. He does this whilst in the *scroll transactions* and *scroll regular payment profiles* routines of the present invention as described in FIGS. 5(j) and 5(k) and 5(r). Upon entering the *delete safeguard* routine the device displays the transaction or profile as described in the respective description referenced **132, 138, 140** and **242**, but alternates this display with a "delete" display in which the characters "DELETE?" are displayed in both display sectors **D6** and **D7**. This is shown as reference **270** in FIG. 5(t). The user then has a decision **271**. To accept the delete the DELETE key should be selected and held and the OK key selected **272**. This simultaneous key selection provides additional protection from accidental deletion. Alternatively the user may select the CANCEL key **273** to cancel the deletion process. Upon completion of the *delete safeguard* routine the device reverts to the ***bank menu mode***.

FIG. 5(u) illustrates the flowchart segment for the *scroll spend to go* routine of the present invention. The user enters this routine by keying the "→" key in the *bank account spend left* routine **167** of the present invention as described in FIG. 5(l). Upon entering the *scroll spend to go* routine the device accesses the first record of the TO GO memory store **280** which is always the current cumulative balance on the BANK memory store and the current date which is then displayed in display sectors **D7** and **D5** respectively **281**. Upon subsequently scrolling forward using the "→" key **282**, the TO GO memory store is accessed in a chronologically sequential fashion through the anticipated transactions and associated forward cumulative balance. Each anticipated transaction would show the amount, cumulative balance up to that transaction, the due date, the payment type, the frequency if applicable, and a

reminder indicator if applicable so that the user can understand the transactions coming up (as well as those already overdue and in the REM). These pieces of information are displayed in display sectors **D6, D7, D5, D2, D3** and **D8** respectively (again **281** via loop **L6**). In addition the characters "BANK" are shown in the display sector **D1.** The user is therefore informed and so able to actively manage these up-coming commitments in order to take any necessary action to keep within the funds he has available. The first transaction scrolled will be the chronologically earliest such as an uncleared overdue regular payment reminder taken from the REM memory store. The final transaction scrolled will therefore represent the anticipated transaction closest to, but occurring before, the "last day" and have an associated cumulative balance equivalent to the "spend left" as calculated in FIG. 5(l) the *bank account spend left* routine of the present invention. The user may also scroll backwards and forwards the TO GO memory store using the "←" **283** and "→" keys as required to review and re-review the anticipated transactions. The user leaves the *scroll spend to go* routine by selecting either the CANCEL or OK key **284** which then reverts the device to the *bank menu mode.*

CLAIMS

1. A portable electronic calculating device having a personal financial planning function incorporated with a calendar function that is configured to assist with the personal financial planning function,

wherein the device includes means for inputting details of transactions, including date-related information and financial amount information,

wherein the device is adapted to conduct processing of the financial amount information based on the date-related information.

2. A device as claimed in claim 1 which has a keypad for inputting information from the user to the device.

3. A device as claimed in claim 1 which has a visual display for displaying to the user variables associated with the user input as well as the results of calculations performed by the device.

4. A device as claimed in any preceding claim that is configured to assist personal financial planning across a number of different bank and/or credit card accounts individually.

5. A device as claimed in any preceding claim that is configured to provide means for the user to input and record individual bank and/or credit card transactions in relation to user-selected bank and/or credit card accounts.

6. A device as claimed in any preceding claim that is configured to allow the user either to select the current date from the calendar function to ascribe to a transaction or, optionally, to ascribe a different date.

7. A device as claimed in any preceding claim that is configured to provide means for the user to programme details relating to regularly occurring outpayments such as mortgage payments.

8. A device as claimed in any preceding claim that is configured to provide means for the user to programme details relating to regularly occurring receipts such as salary credits.

9. A device as claimed in claim 7 or 8 that is configured to provide means for the user to programme details allowing the device to distinguish regularly occurring manual transactions, that require the user to take action before the transaction is completed, from automated transactions, which will occur without such user action.

10. A device as claimed in claims 7, 8 and 9 that is configured to process automated transactions according to financial amounts, on selected due dates, as programmed by the user.

11. A device as claimed in claims 7, 8 and 9 that is configured to provide the user with reminders of regularly occurring manual transactions, on selected due dates, as programmed by the user.

12. A device as claimed in any preceding claim that is configured to compute and provide means for the user to view a cumulative balance by reference to a sum of the transactions up to a selected date.

13. A device as claimed in any preceding claim that is configured to provide means for the user to browse memorised individually recorded transactions in chronological order.

14. A device as claimed in any preceding claim that is configured to provide means for the user to programme credit, or overdraft, limits applying to a credit card and/or bank account.

15. A device as claimed in any preceding claim that is configured to provide means for the user to programme details relating to a last day of a regular income cycle.

16. A device as claimed in claim 15 that is configured to compute the next such last day following on from the current date.

17. A device as claimed in any preceding claim that is configured to compute funds available in a current income cycle by calculating forward in time to the next such last day, as claimed in claim 16, taking into account a current cumulative balance on a bank account, and taking account of transactions due between the current date and the next such last day.

18. A device as claimed in claim 17 that is configured to provide means for the user to scroll through and browse transactions due between the current date and the next such last day.

19. A device as claimed in claim 17 or 18 that is configured to compute funds available within an overdraft limit in the current income cycle, taking into account a programmed overdraft limit as claimed in claim 14.

20. A device as claimed in any preceding claim that is configured to compute the spend available in a credit card account taking into account a credit limit as claimed in claim 14 and a cumulative balance on the credit card account.

21. A device substantially as hereinbefore described and illustrated in the accompanying drawings.

22. A fully portable self-contained electronic recording, planning and calculating device incorporated with electronic clock and calendar that is configured to assist personal financial planning and organisation without the user having to utilise other tools such as pencils, paper or a "traditional" electronic calculator.

Application No: GB 0209124.7 **Examiner:** Graham Russell
Claims searched: 1-22 **Date of search:** 25 October 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T):

Int Cl (Ed.7): G06F 15/02, 17/60

Other: Online: EPODOC, JAPIO, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	WO 99/23618 A1	(NOTT) see abstract and page 11 lines 5-14	1-3,5,22 (at least)
X	WO 95/23377 A1	(BACKER) see abstract, column 3 line 1 - column 4 line 3	1-3,22 (at least)
X	US 4737911	(SHAPIRO) see abstract	1-3,22 (at least)
X	US 4724527	(SHARP) see abstract	1-3,22 (at least)
X	US 4222109	(SIWULA) see abstract, column 2 lines 30-32 & column 3 lines 41-50	1-3,22 (at least)

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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